July 5, 1962

QUARTERLY REPORT

Prepared On

CONTRACT NO. NObsr 81262

Prepared For

BUREAU OF SHIPS
Department of the Navy
Washington 25, D. C.

491-01

Prepared By

APPLIED RESEARCH INC.
76 South Bayles Avenue
Port Washington, N. Y.

TABLE OF CONTENTS

LIST OF ILLUSTRATIONS

1.0 ABSTRACT

1.10 This report covers the work done on the development of an RF Spectroscope in the range from 100 MC to 1000 MC for the three month period from February 1, 1962 to April 30, 1962. It deals with the following subjects:

1.11 Purpose for the development.

1.12 Names of technical personnel engaged in the development program, together with a summary of the man hours work performed by each.

1.13 A description of the work done during the period from February 1, 1962 to April 30, 1962.

1.14 A project performance and schedule chart is included.

1.15 Program for the next three month interval.

2.0 PURPOSE FOR THE DEVELOPMENT

2.10 The RF Spectroscope shall be developed for the visual display of amplitude and frequency of RF signals in the frequency range of 100 MC to 1000 MC.

2.20 The frequency range of 100 MC to 1000 MC shall be displayed in four swept bands on a 5" oscilloscope screen.

2.30 The spectroscope shall have sweep coverage up to 300 MC electronically with high resolution, with no spurious responses and no internally generated interference.

2.40 It shall be useful as a search receiver, spectrum analyzer, noise interference analyzer or as monitoring equipment.

3.0 TECHNICAL PERSONNEL ENGAGED IN THE PROGRAM AND MAN HOURS

3.10 The following is a list of technical personnel engaged in the development of the spectroscope together with the total number of hours spent by each during the period from February 1, 1962 to April 30, 1962.

Name	Total Hours Per Man
Martin Heller	458.75
Leonard Pollachek	169.25
Earl Morrison	191.75
Frank Sokolski	341.50
Charles Copp	21.00
Joseph Fazzino	67.50
Daniel Smoley	16.50
Harry Brown	10.75
Al Kennard	57.25
	1,334.25

4.0 DESCRIPTION OF WORK

4.10 During the period covered by this report the following tasks have been undertaken.

4.11 A survey of the scope of work required to complete the development of the spectroscope was firmed up. It was decided that the spectroscope would comprise the following packages:

4.11.1 The Control Package - This package includes all switching and control functions such as channel and band selectivity and RF and IF signal attenuators. A metering facility for self-checking and trouble-shooting is provided. All sweep functions are controlled, including dispersion, under frequency and sweep rate. Power switching and overload protection are included in this package.

4.11.2 The RF Heads - Each RF head consists of a bandpass filter, RF preamplifier, converter, post amplifier (IF) and self-contained power pack. The four RF units encompass the range from 100 MC to 1000 MC in the following steps:

Unit 1A3 - 100 MC to 200 MC

Unit 1A4 - 200 MC to 400 MC

Unit 1A5 - 400 MC to 700 MC

Unit 1A6 - 700 MC to 1000 MC

4.11.3 The Power Supply Package - This package contains the power supplied to all circuitry not included in the RF heads.

4.11.4 The Sweep Oscillator Package - This package contains

the two sweep local oscillators encompassing the sweep span from 875 MC to 1475 MC in two ranges as follows:

Unit 1A2A1 - 875 MC to 1175 MC

Unit 1A2A2 - 1175 MC to 1475 MC

In addition, the package contains coaxial switches for selecting the desired sweep range.

4.11.5 The IF Amplifier Package - This package includes two IF amplifiers, IF bandpass filters, the lin-log amplifier, the power IF amplifier, linear detector and video output stage.

4.11.6 A block diagram of the unit is shown in Figure 1, Dwg. No. R700458.

4.12 A paper design of a lin-log amplifier was nearly completed during this period. The unit combines logarithmic and linear amplification in a single amplifier. A selector switch on the control panel will enable the choice of either function. The logarithmic response is obtained by a feedback arrangement which controls the conduction of diodes shunting the plate circuits of the IF amplifier. A video detector followed by a DC coupled transistorized video amplifier develops the control voltage for the plate loading diodes. For linear amplification, the video amplifier is disabled while the loading diodes are slightly back biased so that they cannot load the interstage networks. In this mode, the amplifier has a linear response. A partial schematic of the lin-log amplifier is shown in Figure 2, Dwg. No. B600760.

4.13 During this period, work was performed in trying to improve the stability of the 1250 MC oscillator in the 475 to 775 MC converter. The oscillator tank circuit comprises a strip line which is inherently stable and rugged. The unit was paper designed, breadboarded and aligned. A partial schematic diagram of the unit is shown in Figure 3, Dwg. No. B600784.

4.14 Circuitry was designed and breadboarded to improve frequency linearity versus sweep voltage for the varactor swept oscillators. The sweep voltage is fed to a passive network matrix which combines the sweep with the DC center frequency voltage. The combined output is amplified and fed to shaping circuitry which properly shapes the sweep voltage to give the desired linearity. The passive network matrix shown in Figure 4, Dwg. No. 600759, combines the DC center frequency voltage and the sweep voltage in such a way as to maintain the correct balance between these two to permit proper shaping while varying the setting of the dispersion control. The shaped sweep voltage is then fed to a difference amplifier, the output of which is applied to the varactor of the sweep oscillator. Figure 5, Dwg. No. A700464, is a block diagram of the control and shaping circuitry.

4.15 A 402.5 MC oscillator with dual output was designed and breadboarded during this period. Each of the dual outputs feeds a converter. One converter translates the 775 MC IF signal to 30 MC. The other converts the 30 MC signal back to 775 MC. The 775 MC reconverted signal is then fed to the lin-log amplifier. Either a 5 KC crystal filter or a 25 KC crystal filter, each centered at 30 MC, is interposed between the 775 MC

to 30 MC converter and the 30 MC to 775 MC converter to obtain the greatest resolving capability of the spectroscope. The second harmonic of the 402.5 MC dual output oscillator, or 805 MC, is used as the injection frequency to convert the 775 MC signal to 30 MC and then the 30 MC signal back to 775 MC respectively. Since the oscillator feeds both converters, the intention is to isolate the two oscillator outputs from one another at the signal frequency of 775 MC. This is accomplished by using a low pass filter at each of the two outputs of the oscillator which passes 402.5 MC and rejects 775 MC. Figure 6, Dwg. No. B600783, is a schematic diagram of the original 402.5 MC oscillator. Figure 7, Dwg. No. A600812, is the improved version of the same 402.5 MC oscillator.

4.16 The 775 MC to 30 MC converter has been paper designed and breadboarded during this period. It consists of a single grounded grid mixer using tube type 7784, a "pi" section at the input matched at 775 MC and a "pi" section at the output matched at 30 MC. The second harminic of 402.5 MC, or 805 MC, is generated at the input of the type 7784 tube due to its non-linearity. Figure 8, Dwg. No. B600782, is a schematic diagram of the converter.

4.17 A low pass filter has been paper designed. It has a rejection of better than 60 DB at 775 MC. Two of these will be used on either side of the 402.5 MC oscillator, as discussed in paragraph 4.15. A schematic diagram of the unit is shown in Figure 9, Dwg. No. B600781.

4.18 The following units have been completed by engineering and released for fabrication during this period:

A. One LP-HP Bandpass Filter, 100-200 MC, Unit 1A3A1.

B. One LP-HP Bandpass Filter, 200-400 MC, Unit 1A4A1.

C. One LP-HP Bandpass Filter, 400-700 MC, Unit 1A5A1.

D. One LP-HP Bandpass Filter, 700-1000 MC, Unit 1A6A1.

E. Two 775 MC IF Amplifiers, Figure 10, Dwg. No. C600750.

F. One 400-700 MC/775 MC Amplifier/Converter in the 400 to 700 MC RF head, Figure 11, Dwg. No. D600747.

G. One 700-1000 MC/475 MC Amplifier Converter in the 700 to 1000 MC RF head, Figure 12, Dwg. No. D600734.

4.19 A project performance and schedule chart is given in Figure 13, Dwg. No. SF-138.

5.0 PROGRAM FOR THE NEXT THREE MONTH INTERVAL

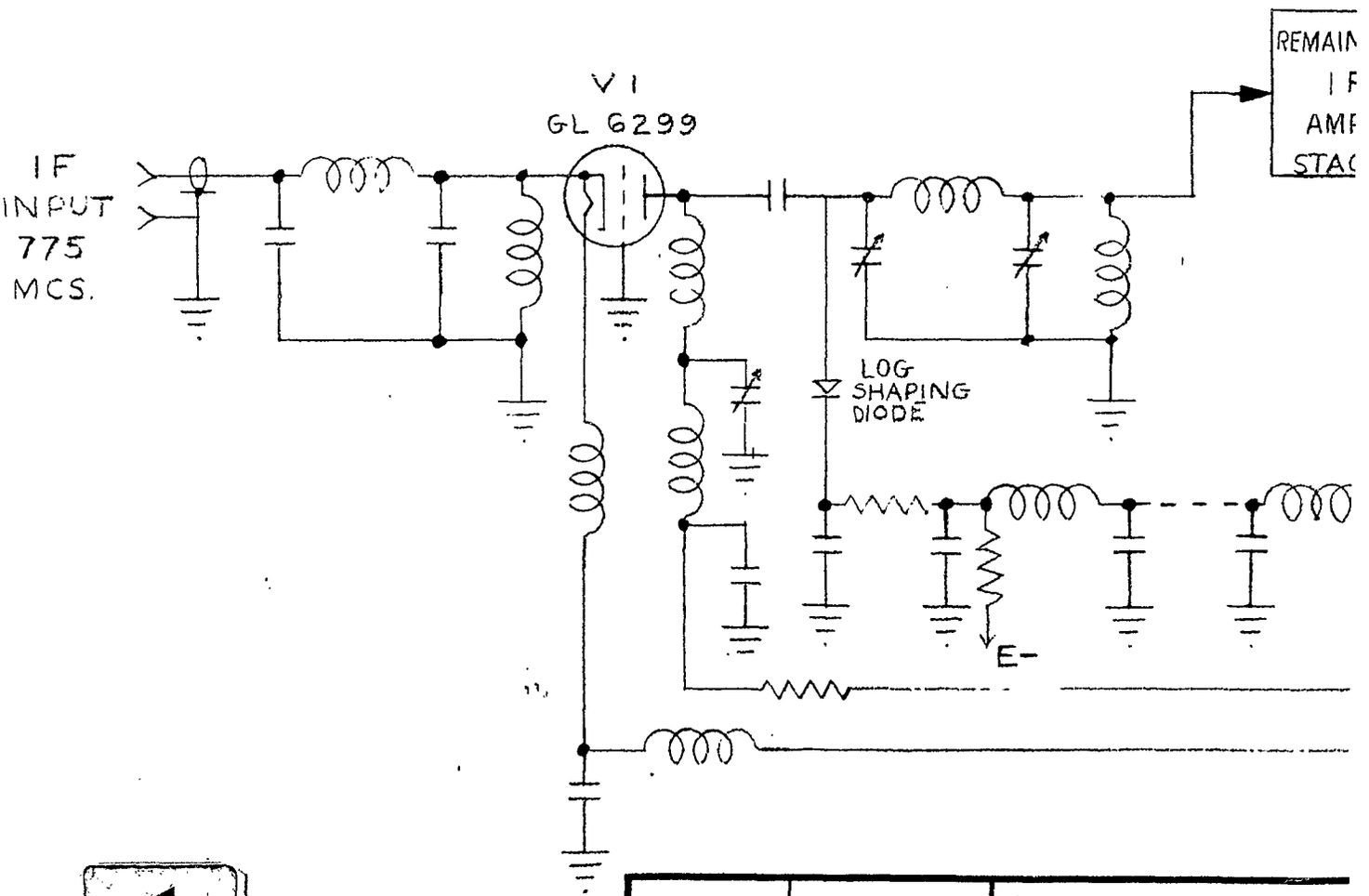
5.10 During the next interval, it is hoped that the following tasks will be completed.

5.11 The power supplies, oscilloscope and crystal filters will be ordered and delivered to the laboratory.

5.12 All individual units will be fabricated.

5.13 The cabinet will be ordered and delivered to the laboratory.

5.14 The assembly of the total system will be completed.



1

491-01	
JOB NO.	NEXT ASSEMBLY
APPLICATION	

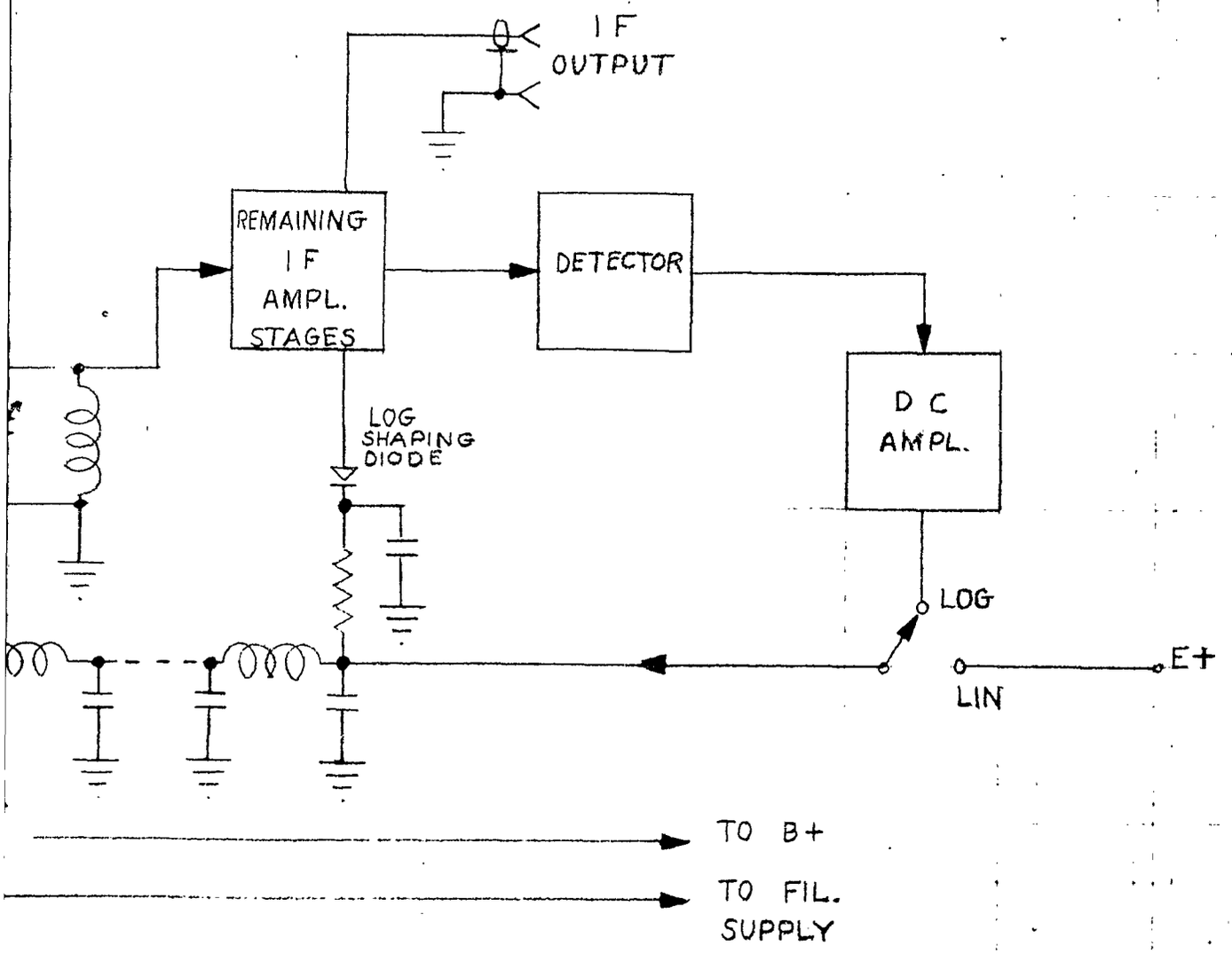
ALL DIMENSIONS IN INCHES, UNL
OTHERWISE SPECIFIED TOLERAN
FRACTIONS ± 1/64 ANGLES ± 1/2
DECIMALS .XX ± .010 .XXX ± .0C

MATERIAL:

FINISH:

OGILVIE PRESS, INC., BROOKLYN 17, N. Y. ULTRAVEL NO. 490M

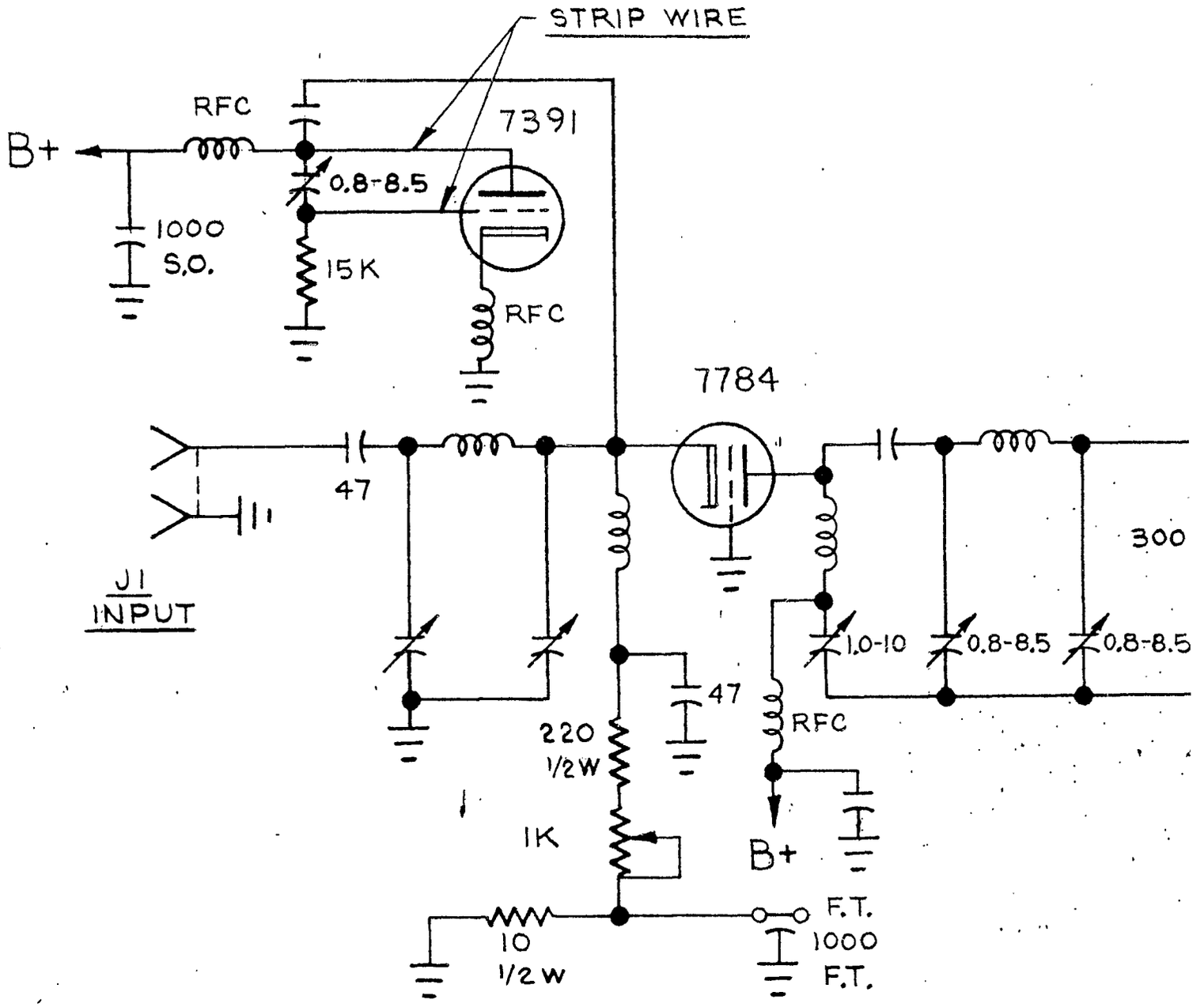
REVISIONS			
ISSUE	DESCRIPTION	DATE	BY



2

. DIMENSIONS IN INCHES, UNLESS HERWISE SPECIFIED TOLERANCES: CTIONS ± 1/64 ANGLES ± 1/2° IMALS .XX ± .010 .XXX ± .005	DRAWN 4-3-62	PARTIAL SCHEMATIC OF LIN LOG AMPLIFIER	APPLIED RESEARCH INC. PORT WASHINGTON NEW YORK
TERIAL:	DRAWN BY F. S.		
	CHECKED		
IISH:	APPROVED		DWG. SIZE B — 600760
	APPROVED	SCALE — UNIT WT.	ISSUE

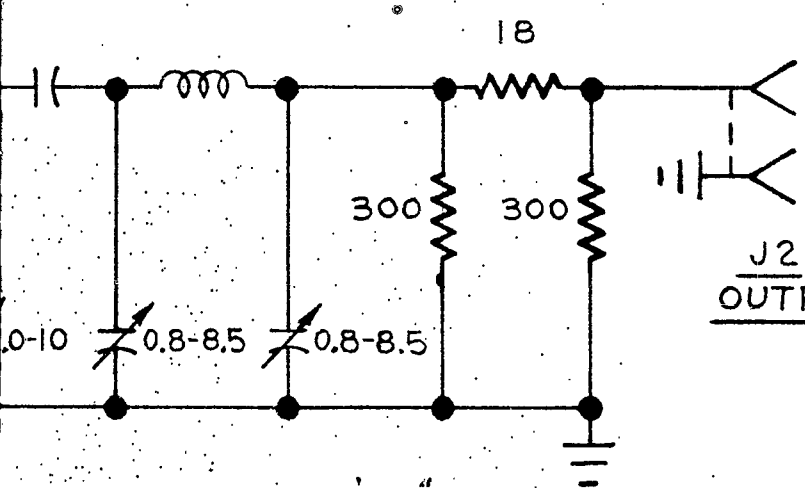
FIG - 2



481-02		ALL DIMENSIONS IN INCHES, UNLESS OTHERWISE SPECIFIED TOLERANCES: FRACTIONS ± 1/64 ANGLES ± 1/2° DECIMALS .XX ± .010 .XXX ± .005
JOB NO.	NEXT ASSEMBLY	MATERIAL: ~
APPLICATION		FINISH: ~

OGILVIE PRESS, INC., BROOKLYN 17, N. Y. ULTRAVEL NO. 490M

REVISIONS			
ISSUE	DESCRIPTION	DATE	BY



2

NOTE:

1. UNLESS OTHERWISE SPECIFIED

(A) ALL CAPACITORS ARE IN μμf

(B) ALL RESISTORS ARE IN OHMS

L DIMENSIONS IN INCHES, UNLESS HERWISE SPECIFIED TOLERANCES:
ACTIONS ± 1/64 ANGLES ± 1/2°
CIMALS .XX ± .010 .XXX ± .005

TERIAL: ~

NISH: ~

DRAWN 5-8-62

DRAWN BY A. Kennard

CHECKED

APPROVED

APPROVED

SCHEMATIC 475/775 MC CONVERTER

SCALE: ~

UNIT WT.

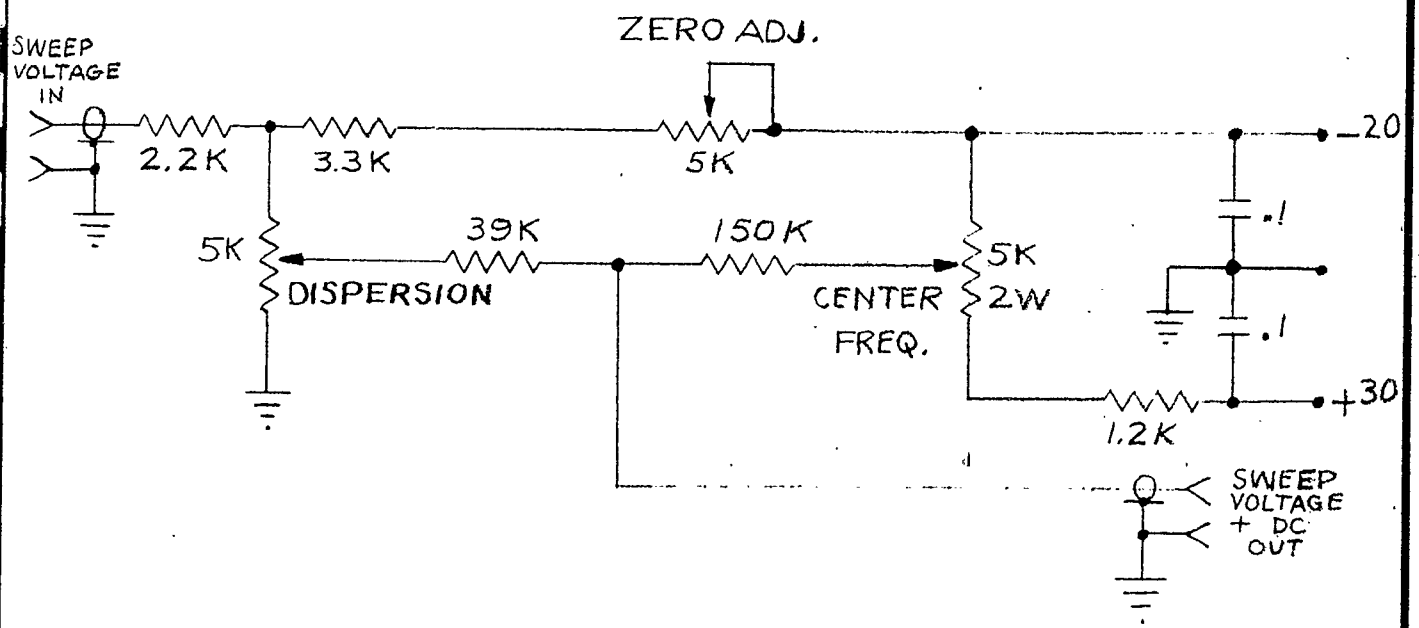
APPLIED RESEARCH INC.
PORT WASHINGTON
NEW YORK

DWG. SIZE B

600784

ISSUE A

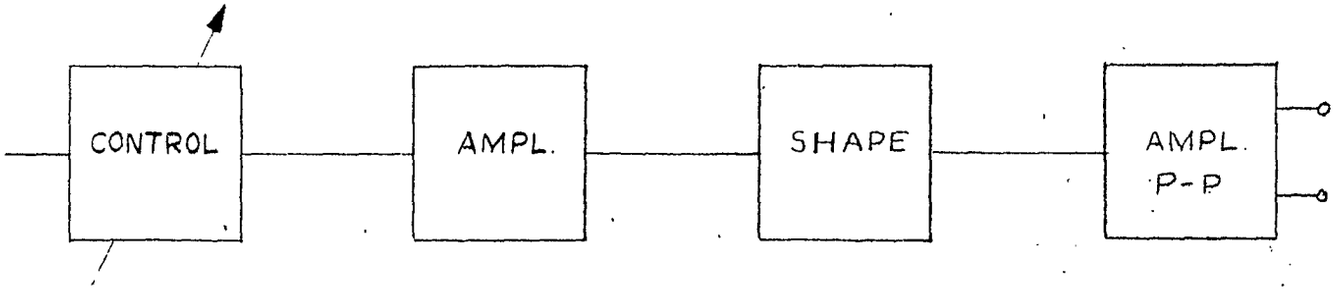
Fig. 3



ALL DIMENSIONS IN INCHES, UNLESS OTHERWISE SPECIFIED TOLERANCES: FRACTIONS ± 1/64 ANGLES ± 1/2° DECIMALS .XX ± .010 .XXX ± .005	PASSIVE NETWORK MATRIX	APPLIED RESEARCH INC. PORT WASHINGTON NEW YORK
MATERIAL:		DWG. SIZE A — 600759
FINISH:	JOB NO. 491-01 / DRAWN 4-2-62 / SCALE —	ISSUE-

OGILVIE PRESS, INC., BROOKLYN 17, N. Y. ULTRAVEL NO. 490M

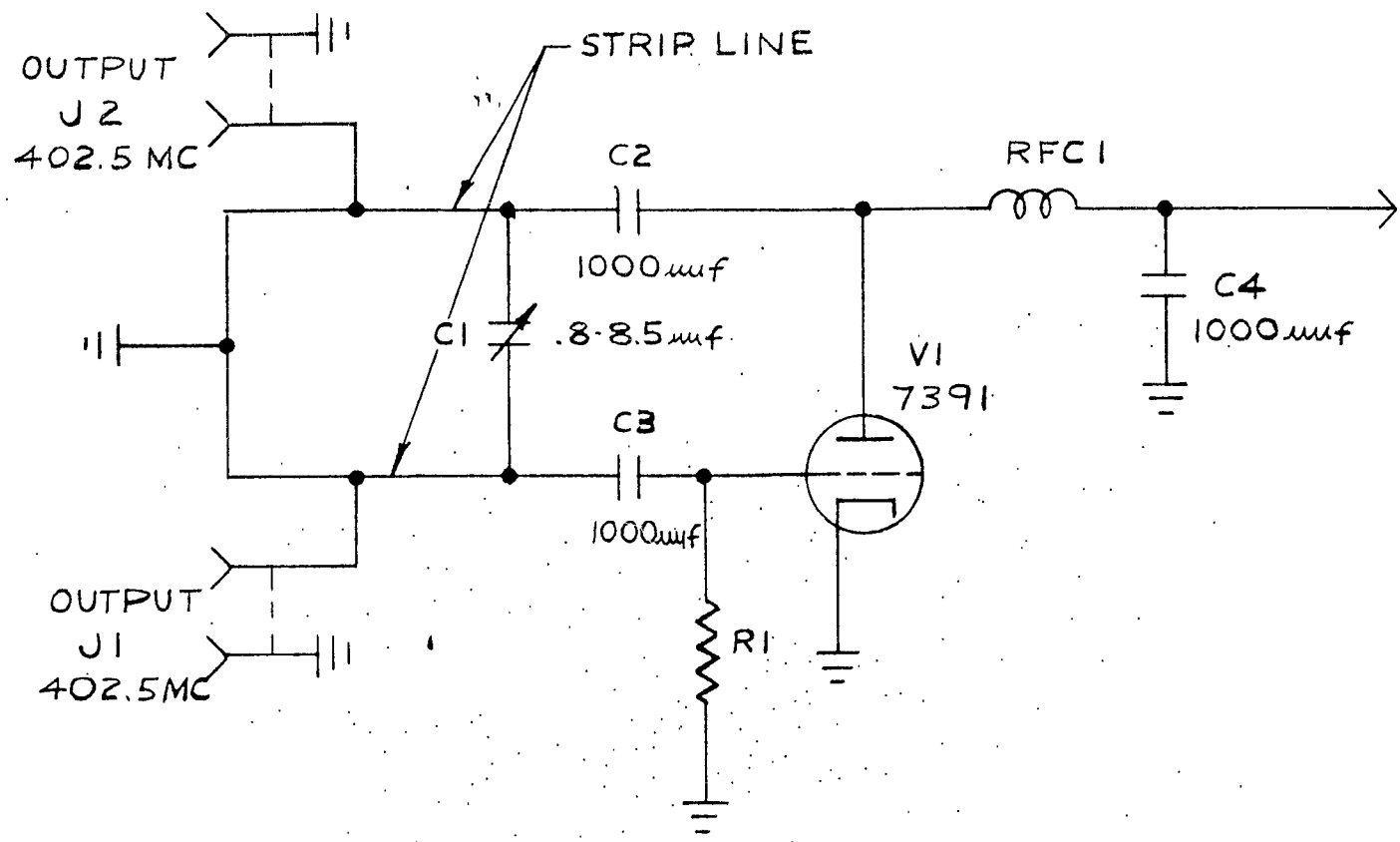
FIG-4



ALL DIMENSIONS IN INCHES, UNLESS OTHERWISE SPECIFIED TOLERANCES: FRACTIONS ± 1/64 ANGLES ± 1/2° DECIMALS .XX ± .010 .XXX ± .005	BLOCK DIAGRAM OF CONTROL & SHAPING CIRCUITRY	APPLIED RESEARCH INC. PORT WASHINGTON NEW YORK
MATERIAL:		DWG. SIZE: A — 700464
FINISH:	JOB NO. 491-01 / DRAWN 4-2-62 / SCALE —	ISSUE-

OGILVIE PRESS, INC., BROOKLYN 17, N. Y. ULTRAVEL NO. 490M

FIG-5



481-02	
JOB NO.	NEXT ASSEMBLY
APPLICATION	

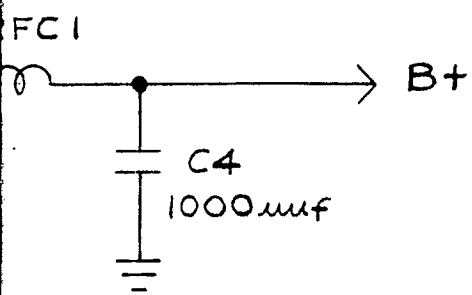
ALL DIMENSIONS IN INCHES, UNLESS OTHERWISE SPECIFIED TOLERANCES:
FRACTIONS ± 1/64 ANGLES ± 1/2°
DECIMALS .XX ± .010 .XXX ± .005

MATERIAL:

FINISH:

OGILVIE PRESS, INC., BROOKLYN 17, N. Y. ULTRAVEL NO. 490M

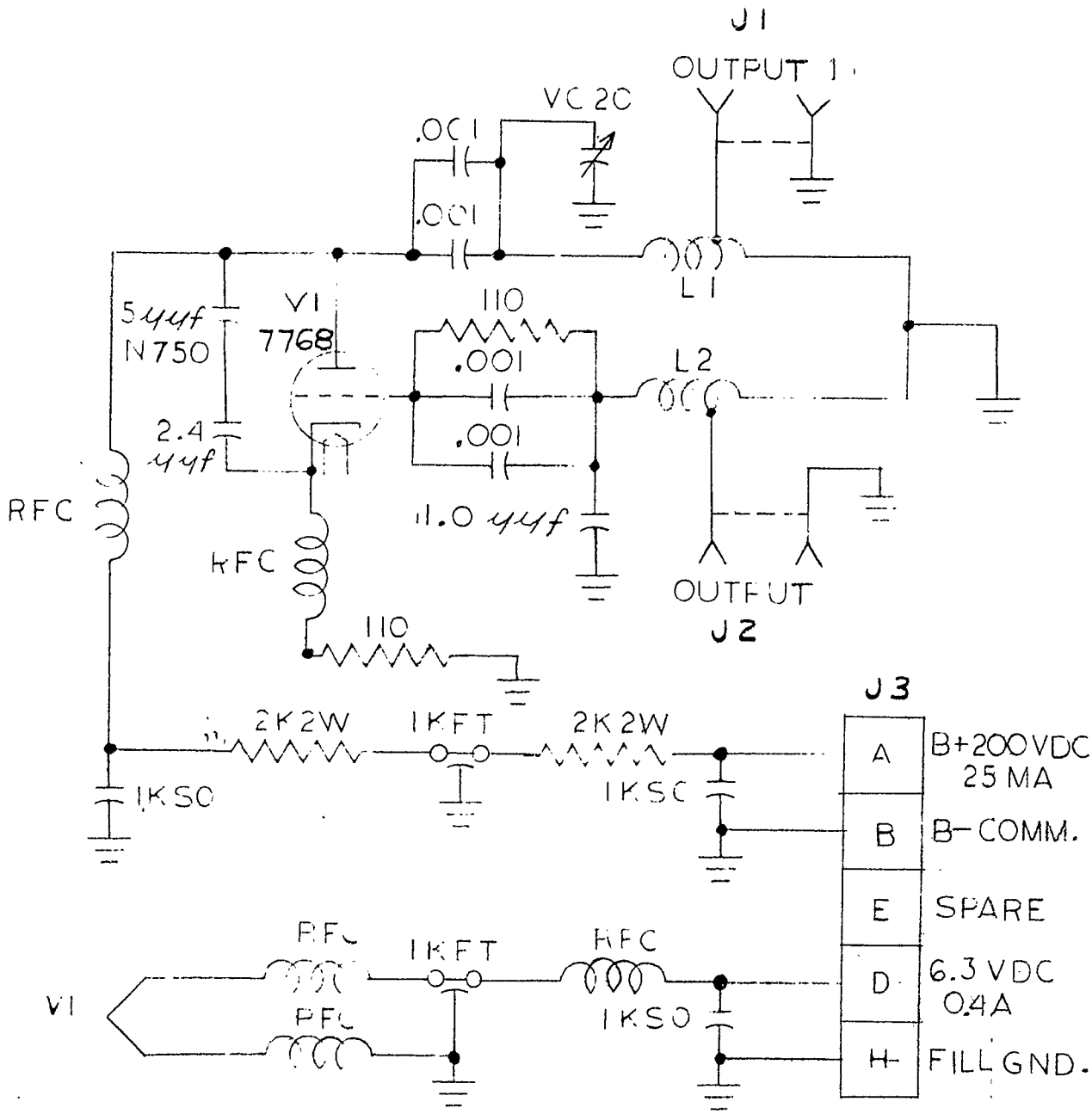
REVISIONS			
ISSUE	DESCRIPTION	DATE	BY



2

DIMENSIONS IN INCHES, UNLESS OTHERWISE SPECIFIED TOLERANCES: FRACTIONS ± 1/64 ANGLES ± 1/2° DECIMALS .XX ± .010 .XXX ± .005	DRAWN 5-8-62	SCHEMATIC 405.2 MC OSCILLATOR	APPLIED RESEARCH INC. PORT WASHINGTON NEW YORK
MATERIAL:	DRAWN BY F PALLADINO		
FINISH:	CHECKED		
	APPROVED		DWG. SIZE B — 600783
	APPROVED	SCALE — UNIT WT.	ISSUE A

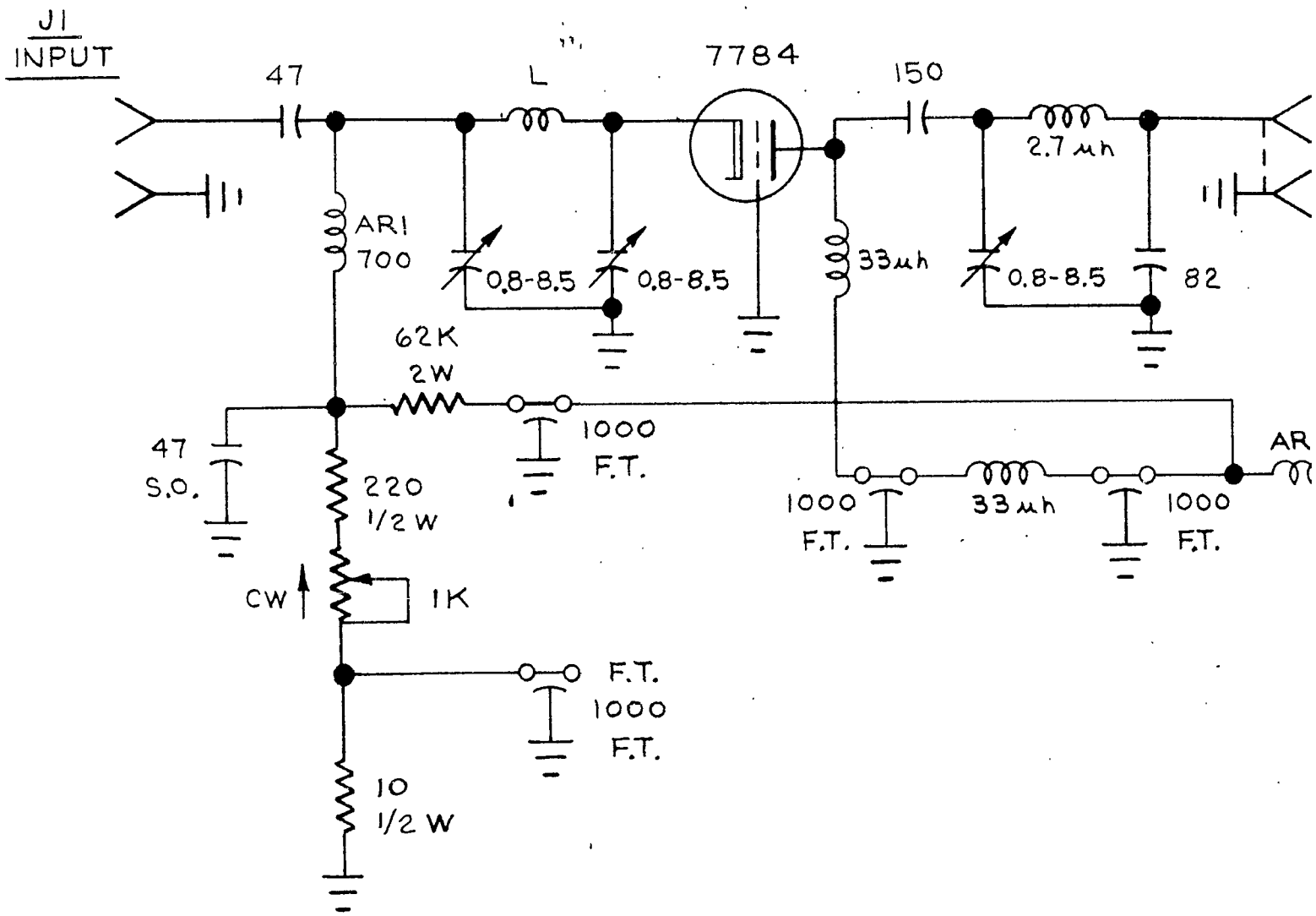
FIG 6

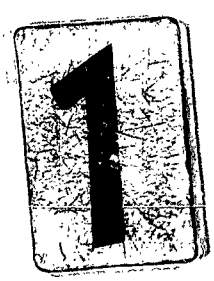


ALL DIMENSIONS IN INCHES, UNLESS OTHERWISE SPECIFIED TOLERANCES: FRACTIONS ± 1/64 ANGLES ± 1/2° DECIMALS .XX ± .010 .XXX ± .005	SCHEMATIC STRIP LINE LOCAL OSCILLATOR UNIT 1A7A13		APPLIED RESEARCH INC. PORT WASHINGTON NEW YORK
MATERIAL:			DWG. SIZE A — 600812
FINISH:	JOB NO. 491-01	DRAWN JML	SCALE — ISSUE-

OGILVIE PRESS, INC., BROOKLYN 17, N. Y. ULTRAVEL NO. 490M

Fig 7



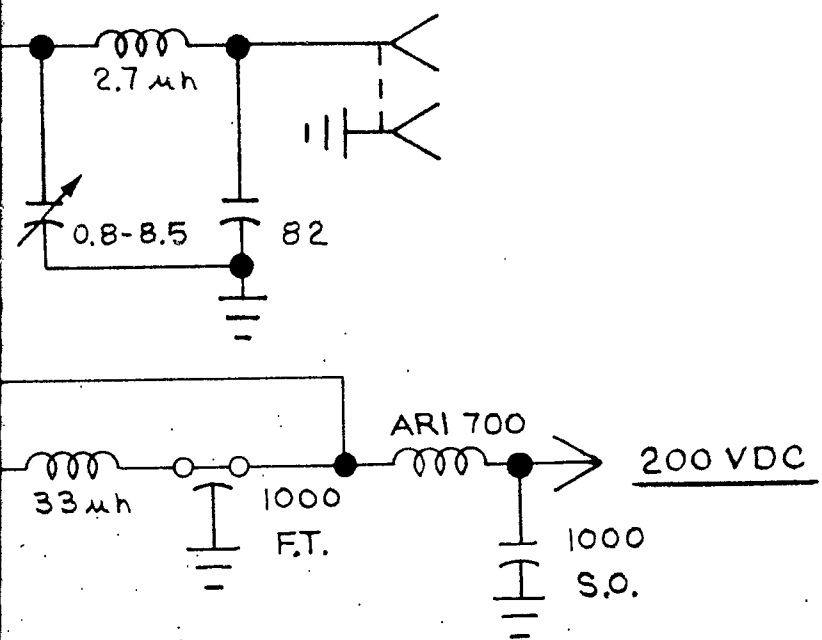


481-02		ALL DIMENSIONS IN INCHES, UNLESS OTHERWISE SPECIFIED TOLERANCES: FRACTIONS ± 1/64 ANGLES ± 1/2° DECIMALS .XX ± .010 .XXX ± .005
JOB NO.	NEXT ASSEMBLY	MATERIAL: ~
APPLICATION		FINISH: ~

OGILVIE PRESS, INC., BROOKLYN 17, N. Y. ULTRAVEL NO. 490M

REVISIONS			
ISSUE	DESCRIPTION	DATE	BY

J2
OUTPUT



2

NOTE:

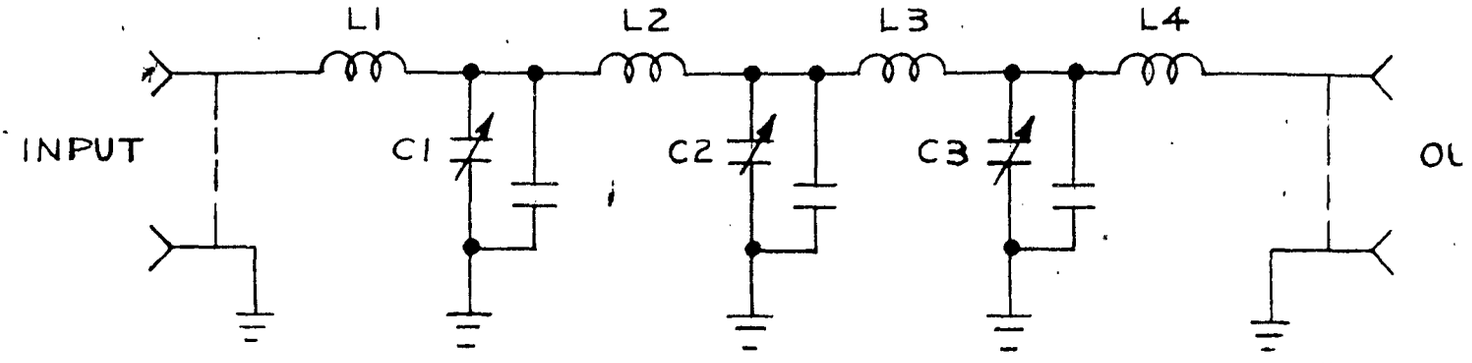
1. UNLESS OTHERWISE SPECIFIED

(A) ALL CAPACITORS ARE IN μμf

(B) ALL RESISTORS ARE IN OHMS

ALL DIMENSIONS IN INCHES, UNLESS OTHERWISE SPECIFIED TOLERANCES: FRACTIONS ± 1/64 ANGLES ± 1/2° DECIMALS .XX ± .010 .XXX ± .005	DRAWN 5-8-62	SCHEMATIC 775 MC/30 MC CONVERTER	APPLIED RESEARCH INC. PORT WASHINGTON NEW YORK
MATERIAL: ~	DRAWN BY a. Kennard		
	CHECKED		
FINISH: ~	APPROVED		DWG. SIZE B — 600782
	APPROVED	SCALE ~ — UNIT WT.	ISSUE A

FIG 8



ELECTRICAL REQ'S

1- 3db PT = 415 MC

2- 60db PT = 770 MC

3- RIPPLE = 0.1db

4- Z_{IN} = 50 Ω

5- Z_{OUT} = 50 Ω

1

481-02	
JOB NO.	NEXT ASSEMBLY
APPLICATION	

ALL DIMENSIONS IN INCHES, UNLESS OTHERWISE SPECIFIED TOLERANCES:
FRACTIONS ± 1/64 ANGLES ± 1/2°
DECIMALS .XX ± .010 .XXX ± .005

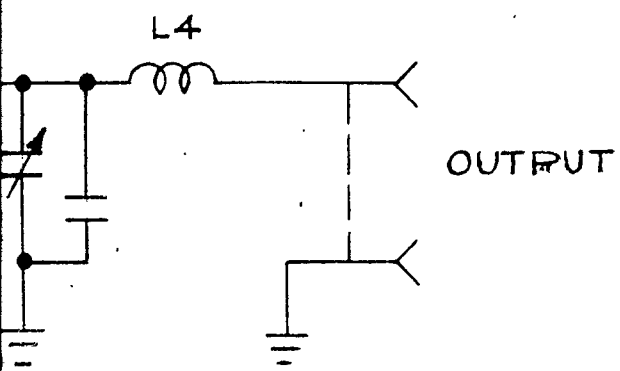
MATERIAL:

FINISH:

DR 5-8
DRAV F.PALI
CHE
APPR
APPR

OGILVIE PRESS, INC., BROOKLYN 17, N. Y. ULTRAVEL NO. 490M

REVISIONS			
ISSUE	DESCRIPTION	DATE	BY



2

L DIMENSIONS IN INCHES, UNLESS
HERWISE SPECIFIED TOLERANCES:
ACTIONS ± 1/64 ANGLES ± 1/2°
CIMALS .XX ± .010 .XXX ± .005

ATERIAL:

NISH:

DRAWN 5-8-62

DRAWN BY F.PALLADINO

CHECKED

APPROVED

APPROVED

SCHEMATIC LOW PASS FILTER

SCALE

UNIT WT.

APPLIED RESEARCH INC.
PORT WASHINGTON
NEW YORK

DWG. SIZE B

600781

ISSUE- A

FIG 9

	FEB	MARCH	APRIL	MAY	JU
1. ENGINEERING DEVELOPMENT					
2. MECHANICAL DESIGN					
3. FABRICATION					
4. FINAL TEST					

WORK COMPLETED

WORK TO BE COMPLETED

JOB NO.	NEXT ASSEMBLY
APPLICATION	

ALL DIMENSIONS IN INCHES, UNLESS OTHERWISE SPECIFIED TOLERANCES:
FRACTIONS ± 1/64 ANGLES ± 1/2°
DECIMALS .XX ± .010 .XXX ± .005

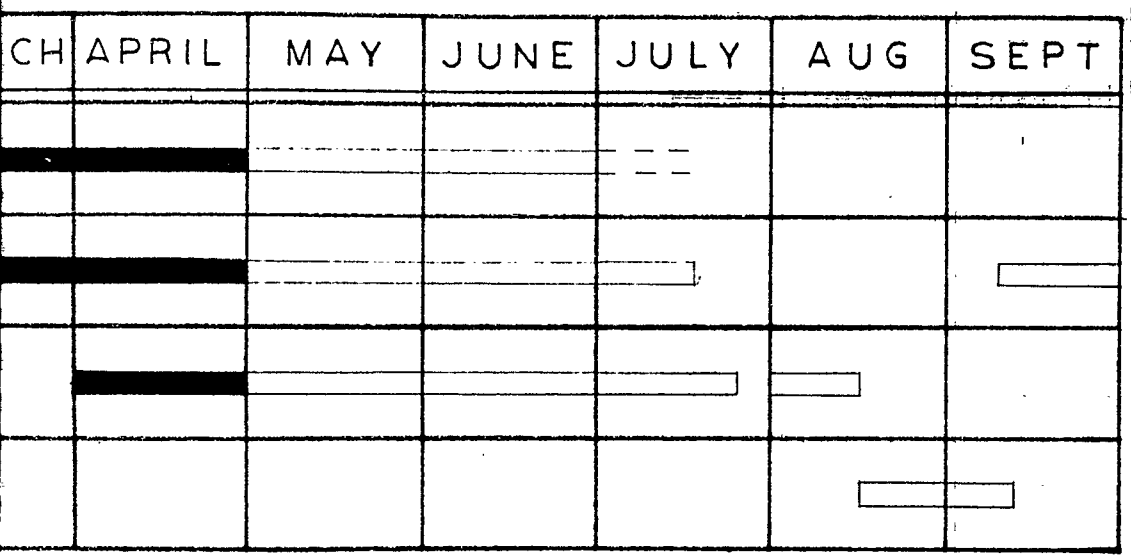
MATERIAL:

FINISH:

DR
6-2
DRAV
WILL
CHE
APPR
APPR

OGILVIE PRESS, INC., BROOKLYN 17, N. Y. ULTRAVEL NO. 490M

REVISIONS			
ISSUE	DESCRIPTION	DATE	BY



L DIMENSIONS IN INCHES, UNLESS
THERWISE SPECIFIED TOLERANCES:
ACTIONS ± 1/64 ANGLES ± 1/2°
CIMALS .XX ± .010 .XXX ± .005

ATERIAL:

NISH:

DRAWN 6-21-62

DRAWN BY WILLIAMS

CHECKED

APPROVED

APPROVED

SPECTROSCOPE PROJECT PERFORMANCE AND SCHEDULE CHART

SCALE —— UNIT WT. ——

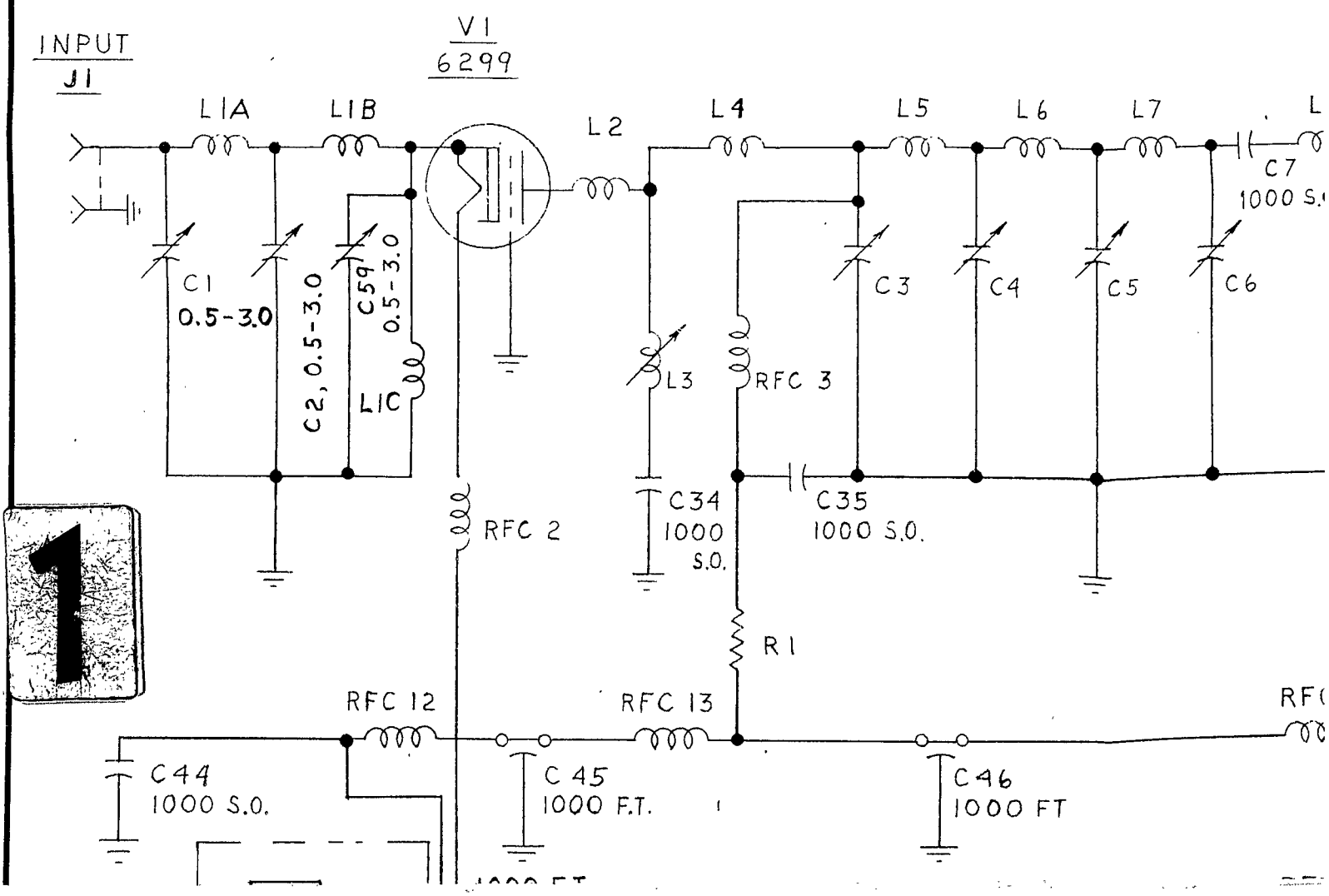
APPLIED RESEARCH INC.
PORT WASHINGTON
NEW YORK

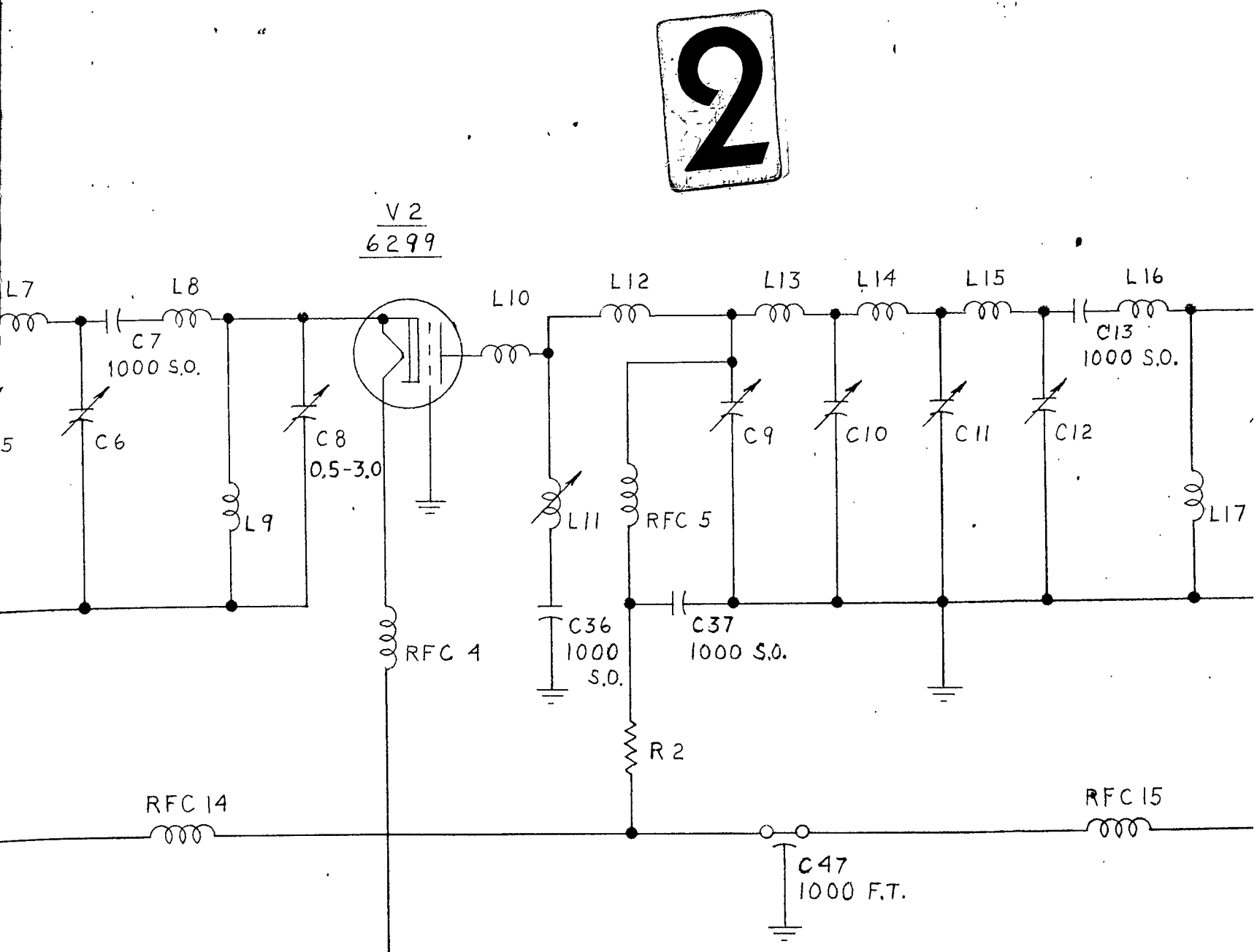
DWG. SIZE B

SF-138

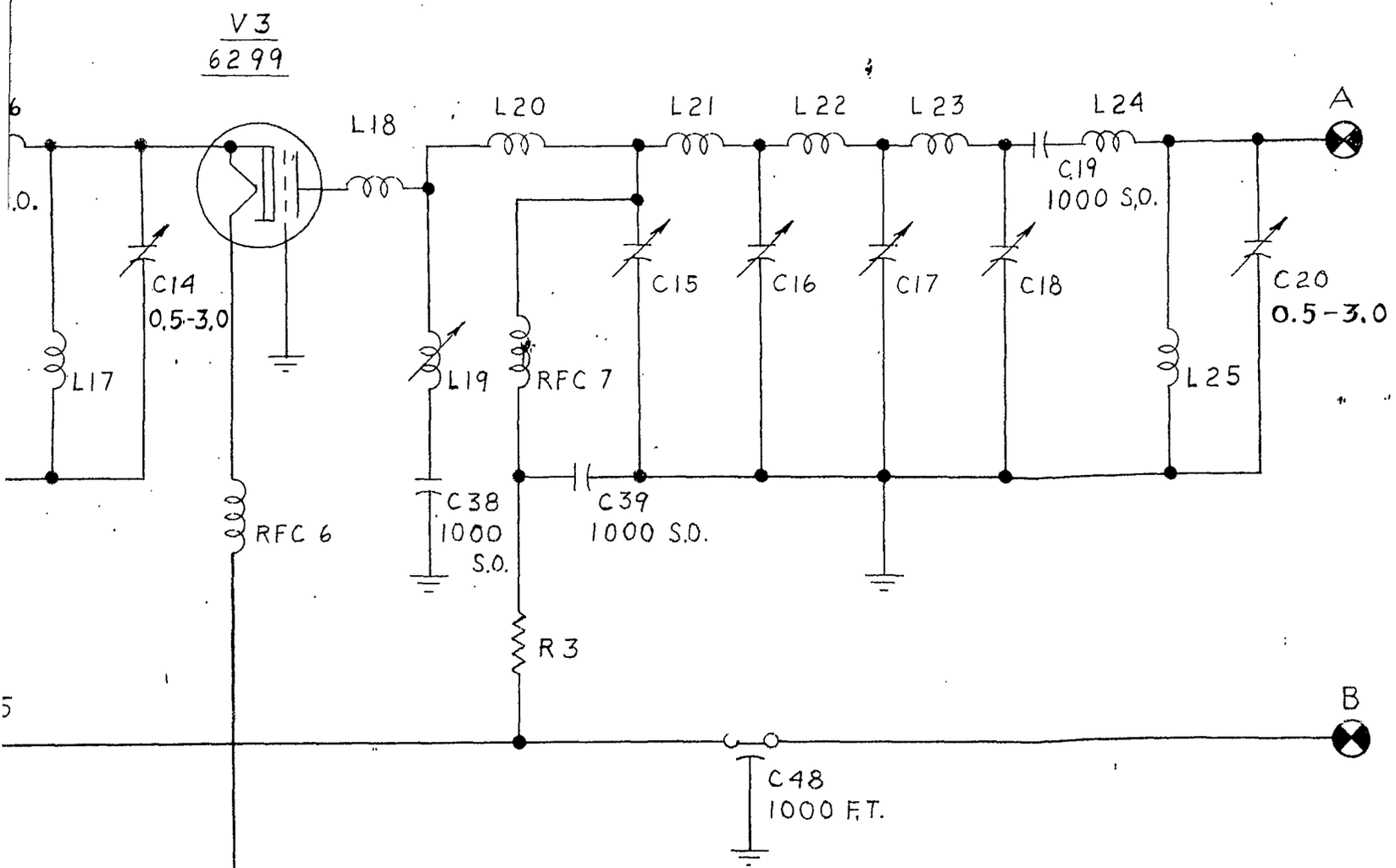
ISSUE A

Fig. 13

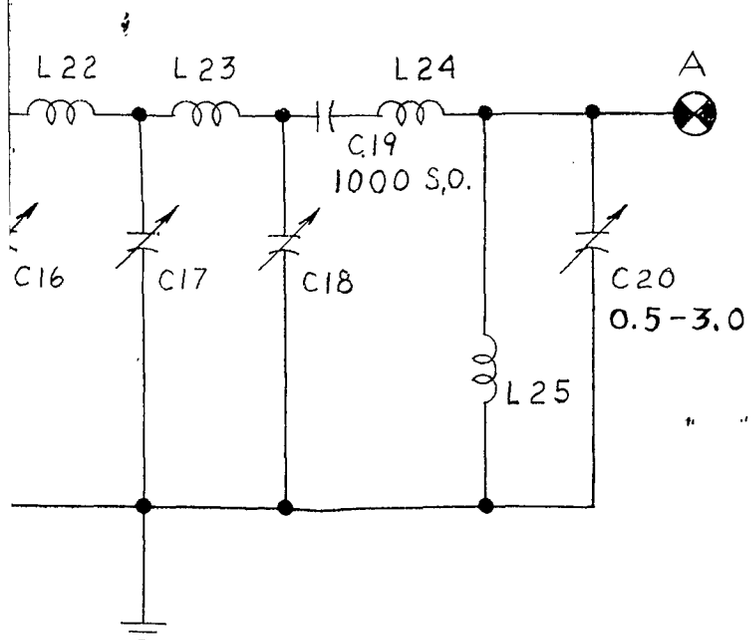

INPUT
J1
V1
6299
L1A
L1B
L2
L4
L5
L6
L7
C7
1000 S.
C1
0.5-3.0
C2, 0.5-3.0
C59
0.5-3.0
L1C
C3
C4
C5
C6
L3
RFC 3
C34
1000
S.O.
C35
1000 S.O.
RFC 2
R1
RFC 12
RFC 13
C44
1000 S.O.
C45
1000 F.T.
C46
1000 FT


V 2
6299
L7
L8
C7
1000 S.O.
C6
C8
0.5-3.0
L9
L10
L12
L13
L14
L15
L16
C13
1000 S.O.
C9
C10
C11
C12
L11
RFC 5
L17
C36
1000
S.O.
C37
1000 S.O.
RFC 4
R2
RFC 14
RFC 15
C47
1000 F.T.

3


V3
6299
L18
L20
L21
L22
L23
L24
A
C19
1000 S.O.
C14
0.5-3.0
C15
C16
C17
C18
C20
0.5-3.0
L17
L19
RFC 7
L25
RFC 6
C38
1000
S.O.
C39
1000 S.O.
R3
B
C48
1000 P.T.

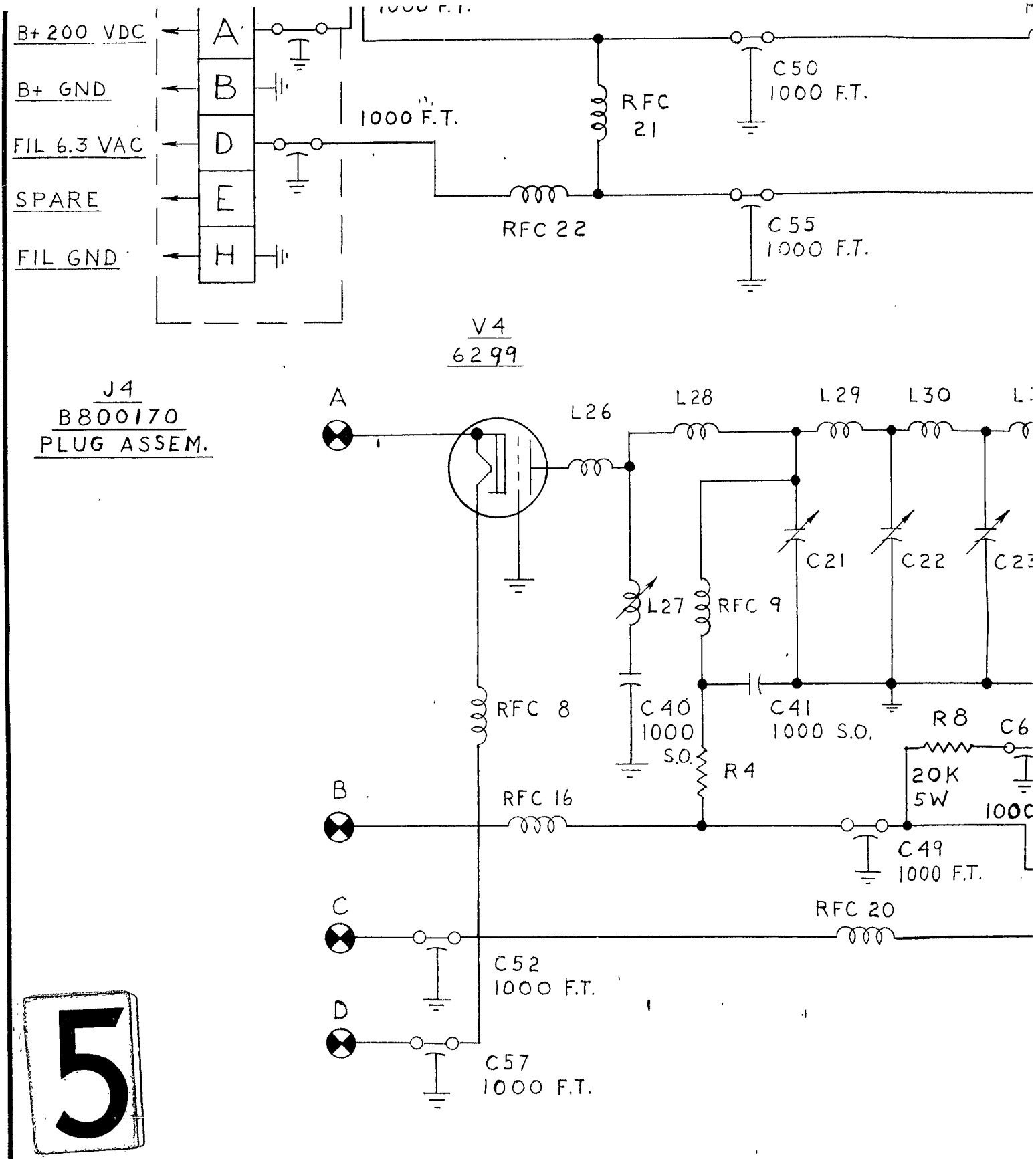
REVISIONS			
ISSUE	DESCRIPTION	DATE	BY



B

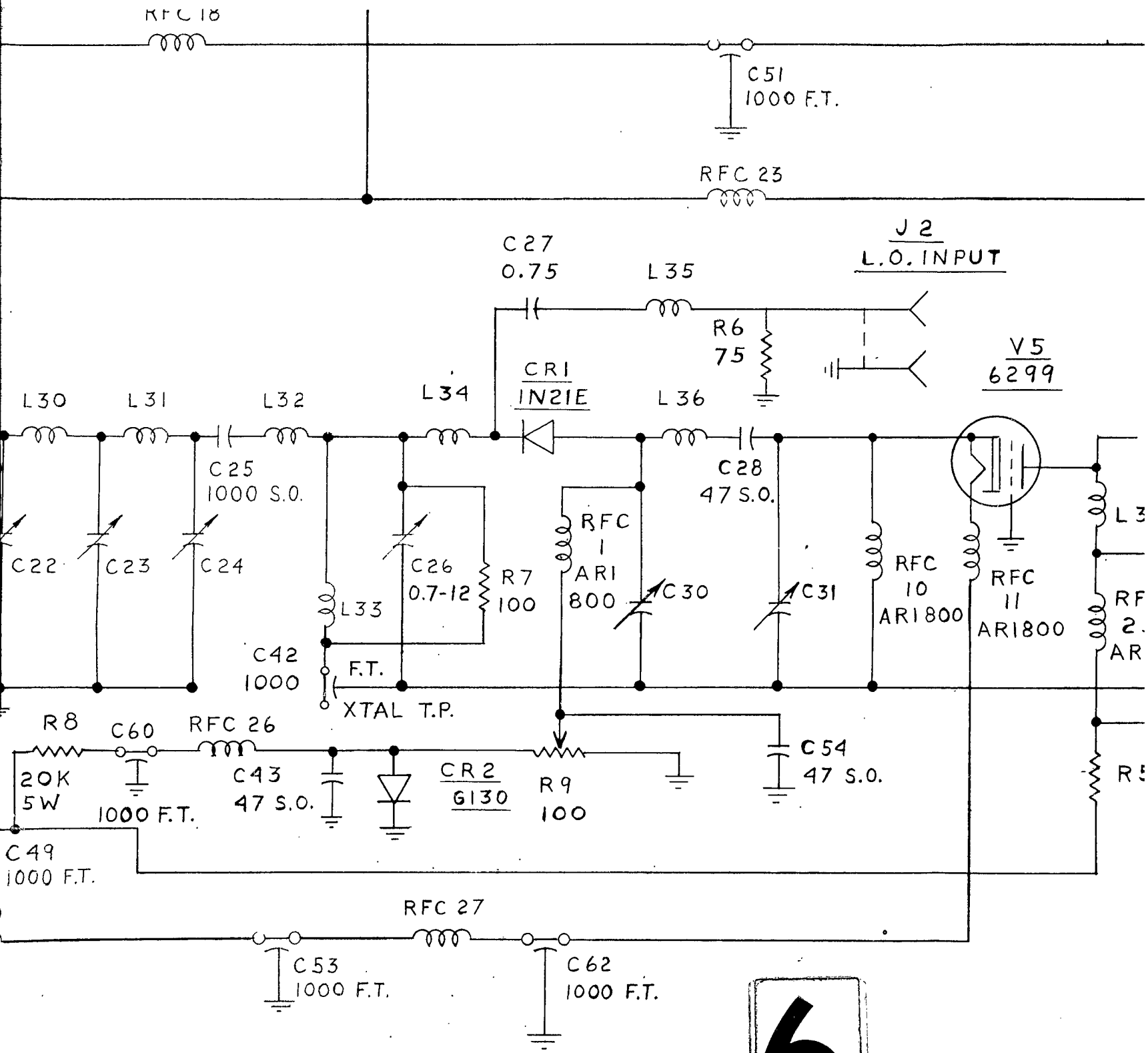
C48
000 F.T.

4

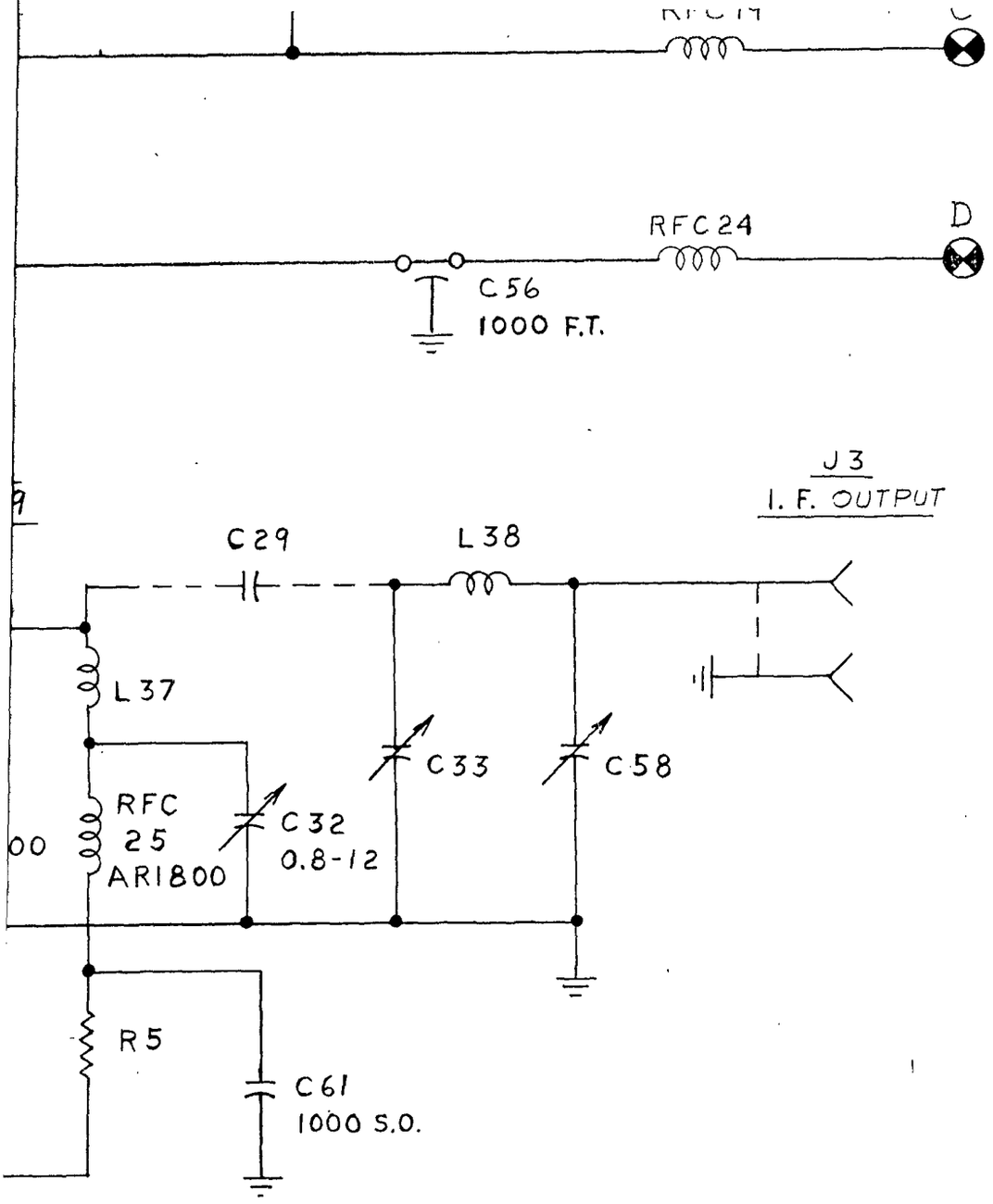


5

OGILVIE PRESS, INC., BROOKLYN 17, N. Y. ULTRAVEL NO. 490M
600657


RFC 18
C51
1000 F.T.
RFC 23
C27
0.75
L35
J2
L.O. INPUT
R6
75
V5
6299
CR1
IN21E
L30
L31
L32
L34
L36
C25
1000 S.O.
C28
47 S.O.
C22
C23
C24
C26
0.7-12
R7
100
L33
RFC
1
ARI
800
C30
C31
RFC
10
AR1800
RFC
11
AR1800
C42
1000
F.T.
XTAL T.P.
R8
20K
5W
C60
1000 F.T.
RFC 26
C43
47 S.O.
CR2
G130
R9
100
C54
47 S.O.
C49
1000 F.T.
RFC 27
C53
1000 F.T.
C62
1000 F.T.

6



7

491-01		ALL DIMENSIONS IN INCHES, UNLESS OTHERWISE SPECIFIED TOLERANCES: FRACTIONS ± 1/64 ANGLES ± 1/2° DECIMALS .XX ± .010 .XXX ± .005	DRAWN 3-28-62
JOB NO.	NEXT ASSEMBLY	MATERIAL:	DRAWN BY AW
APPLICATION		FINISH:	CHECKED
			APPROVED
			APPROVED

SCH
HFW-C(
CO
UN

SCALE

NOTES -

1 - R1 THRU R5 SELECTED FOR 10 MA TUBE CURRENT

2 - UNLESS OTHERWISE NOTED - ALL RES. ARE 1/2 W, ALL RFC ARE A.R.I. 500, ALL CAP. VAR. 0.7 - 8.5, ALL CAP. ARE IN μμf

3 - REF. DESIG. ARE ABBREVIATED - PREFIX THE DESIG. WITH UNIT NO. OR ASSEMBLY DESIG. OR BOTH

LAST COMP. REF. DESIG.					
V	J	L	C	R	RFC
5	4	38	62	9	27

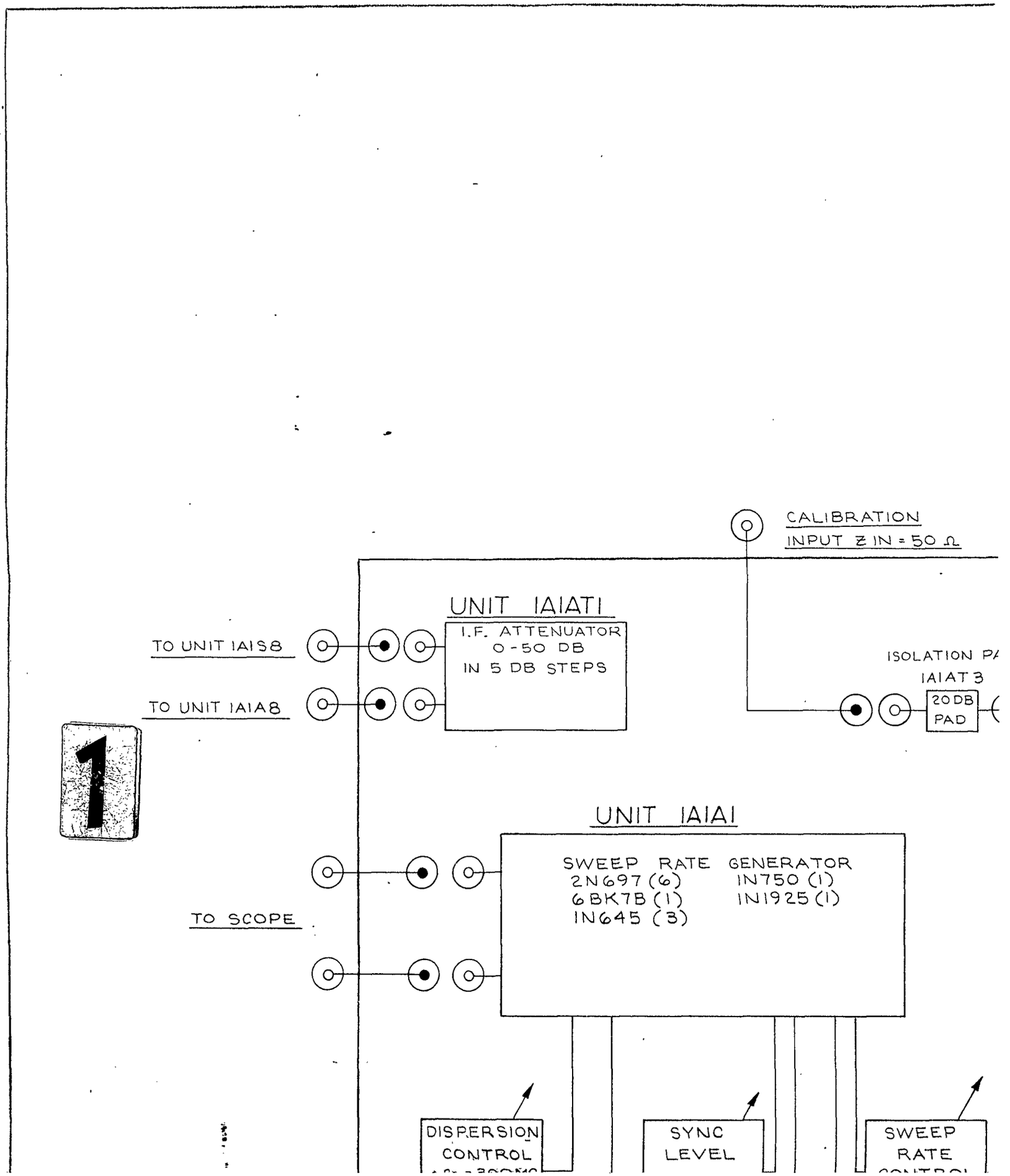
ISSUE A

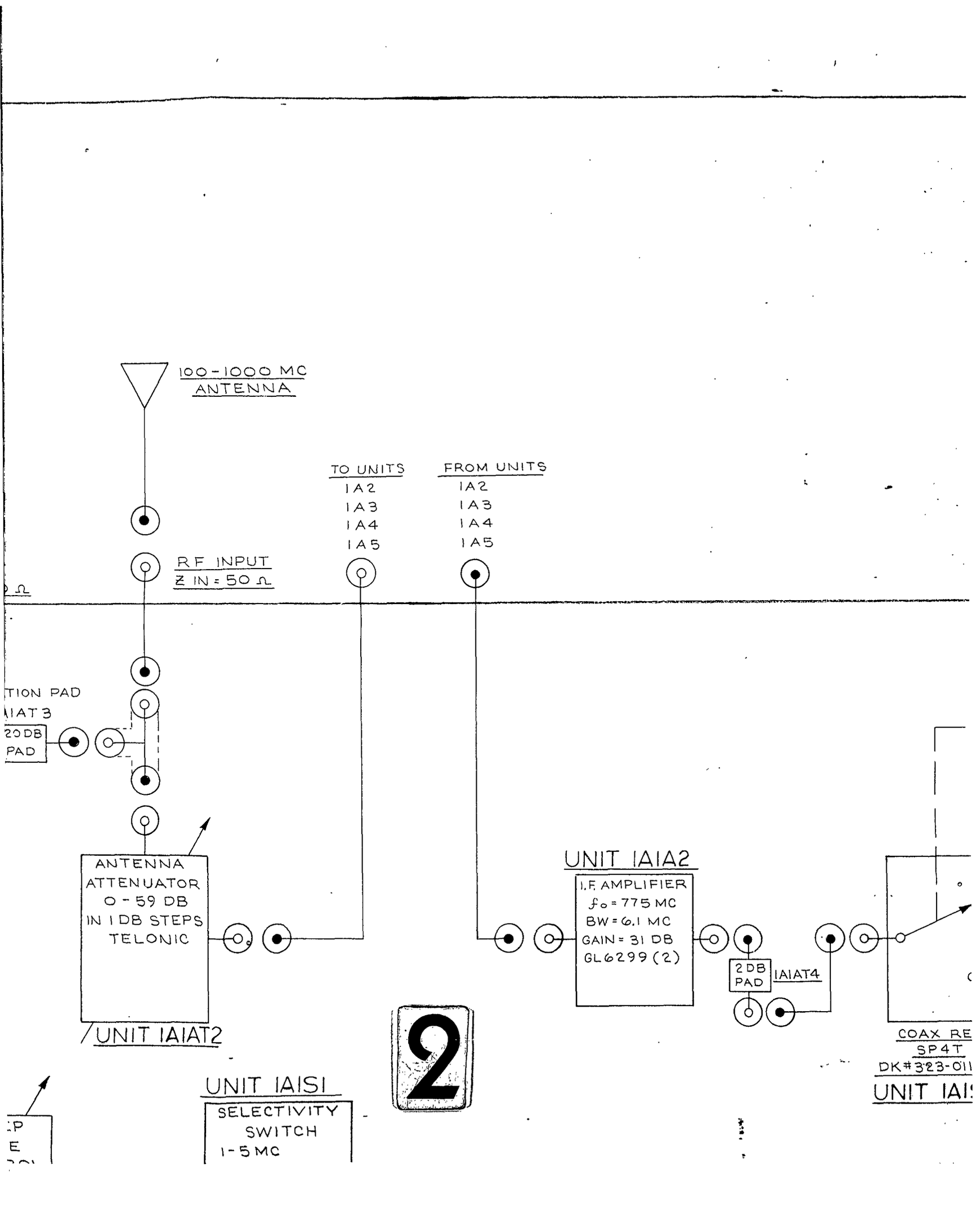
600747

8

ALL DIMENSIONS IN INCHES, UNLESS OTHERWISE SPECIFIED TOLERANCES: FRACTIONS ± 1/64 ANGLES ± 1/2° DECIMALS .XX ± .010 .XXX ± .005	DRAWN 3-28-62	SCHEMATIC HFW-C(A)4070-775/15 CONVERTER UNIT-1A5A2	APPLIED RESEARCH INC. PORT WASHINGTON NEW YORK
MATERIAL: ~	DRAWN BY AW		
	CHECKED		
FINISH: ~	APPROVED		DWG. SIZE D 600747
	APPROVED	SCALE ~ UNIT WT. ~	ISSUE A

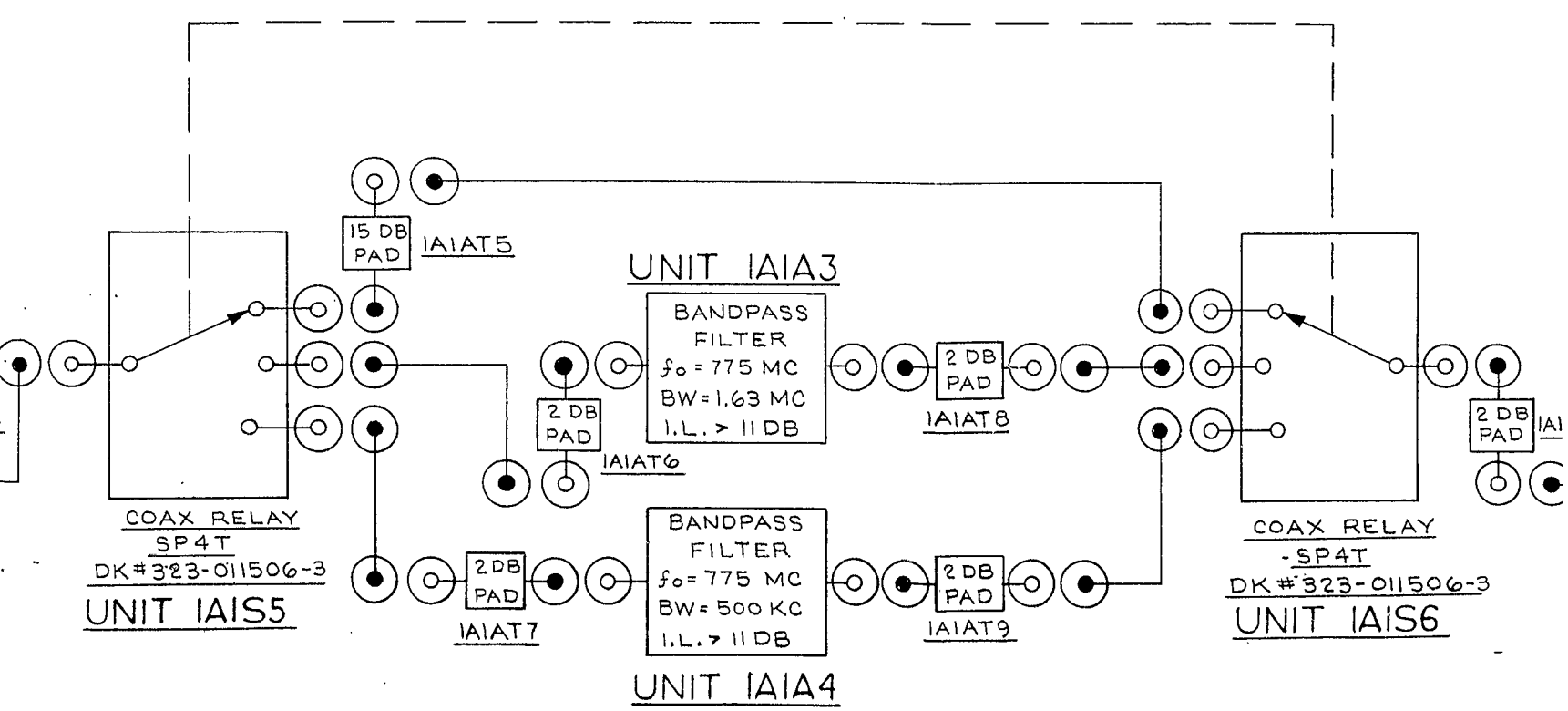
Fig. 11


CALIBRATION
INPUT Z IN = 50 Ω
UNIT IAIAT1
I.F. ATTENUATOR
0-50 DB
IN 5 DB STEPS
TO UNIT IAIS8
TO UNIT IAIA8
ISOLATION PA
IAIAT3
20DB
PAD
1
UNIT IAIAI
SWEEP RATE GENERATOR
2N697 (6)
6BK7B (1)
IN645 (3)
IN750 (1)
IN1925 (1)
TO SCOPE
DISPERSION
CONTROL
SYNC
LEVEL
SWEEP
RATE

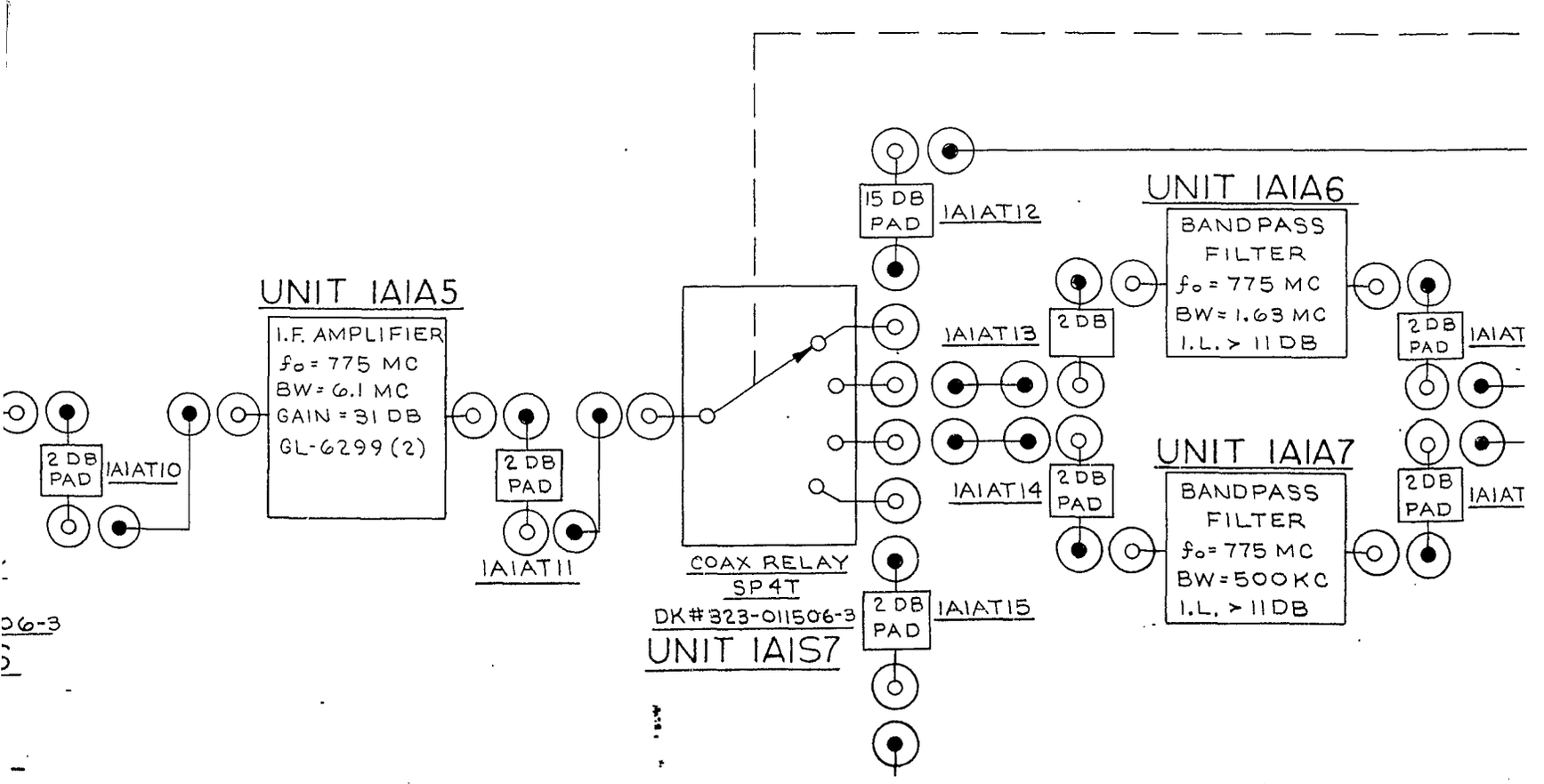

100-1000 MC
ANTENNA
TO UNITS
1A2
1A3
1A4
1A5
FROM UNITS
1A2
1A3
1A4
1A5
RF INPUT
Z IN = 50 Ω
TION PAD
IAT 3
20 DB
PAD
ANTENNA
ATTENUATOR
0 - 59 DB
IN 1 DB STEPS
TELONIC
UNIT 1A1AT2
UNIT 1A1A2
I.F. AMPLIFIER
f_o = 775 MC
BW = 6.1 MC
GAIN = 31 DB
GL6299 (2)
2 DB
PAD
1A1AT4
COAX RE
SP4T
DK#323-011
UNIT 1A1
UNIT 1A1S1
SELECTIVITY
SWITCH
1-5 MC
2

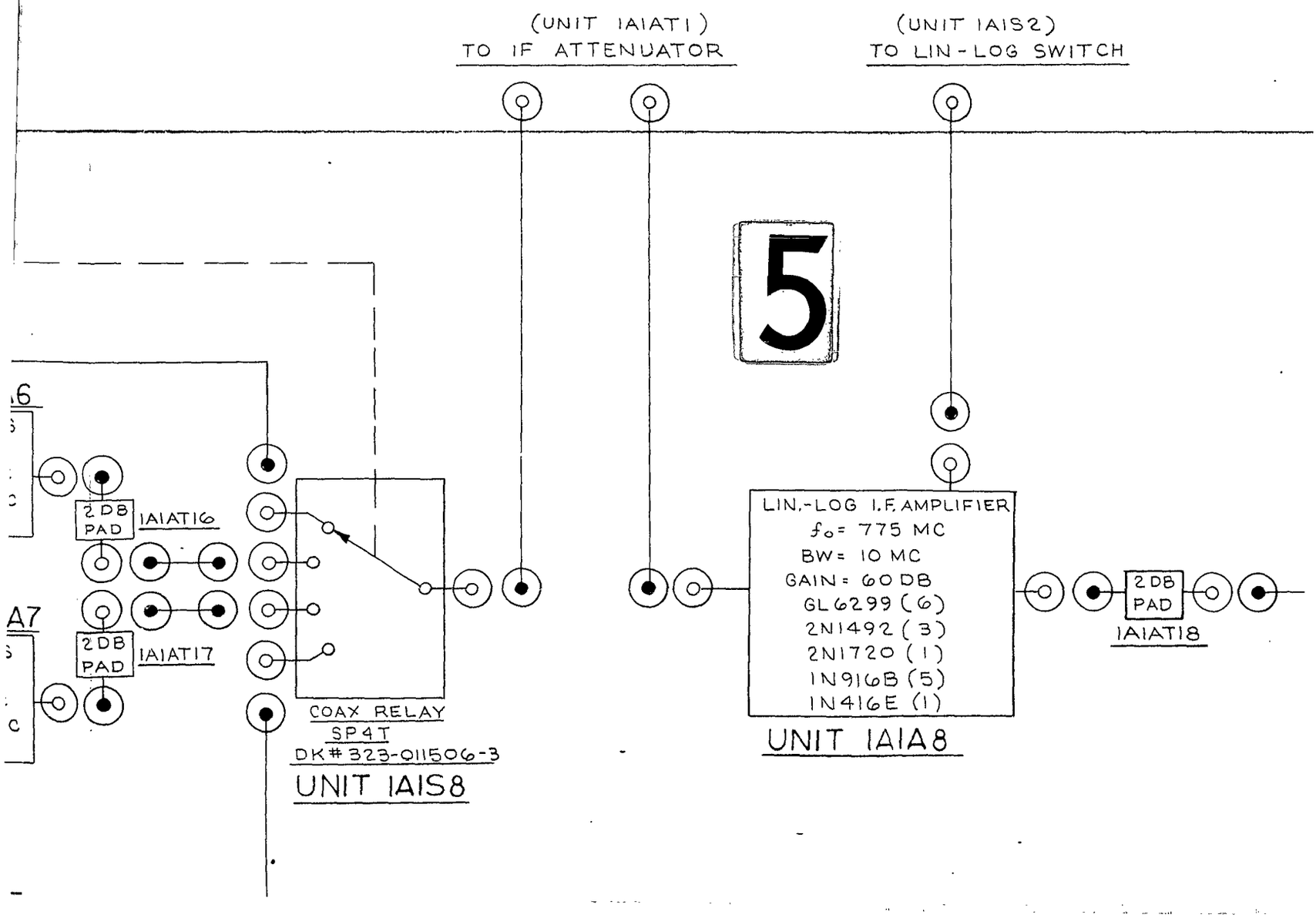
3

UNIT 1A1


15 DB PAD
1A1AT5
UNIT 1A1A3
BANDPASS FILTER
f_o = 775 MC
BW = 1.63 MC
I.L. > 11 DB
2 DB PAD
1A1AT6
2 DB PAD
1A1AT8
2 DB PAD
1A1
COAX RELAY
SP4T
DK#323-011506-3
UNIT 1A1S5
2 DB PAD
1A1AT7
BANDPASS FILTER
f_o = 775 MC
BW = 500 KC
I.L. > 11 DB
2 DB PAD
1A1AT9
UNIT 1A1A4
COAX RELAY
-SP4T
DK#323-011506-3
UNIT 1A1S6

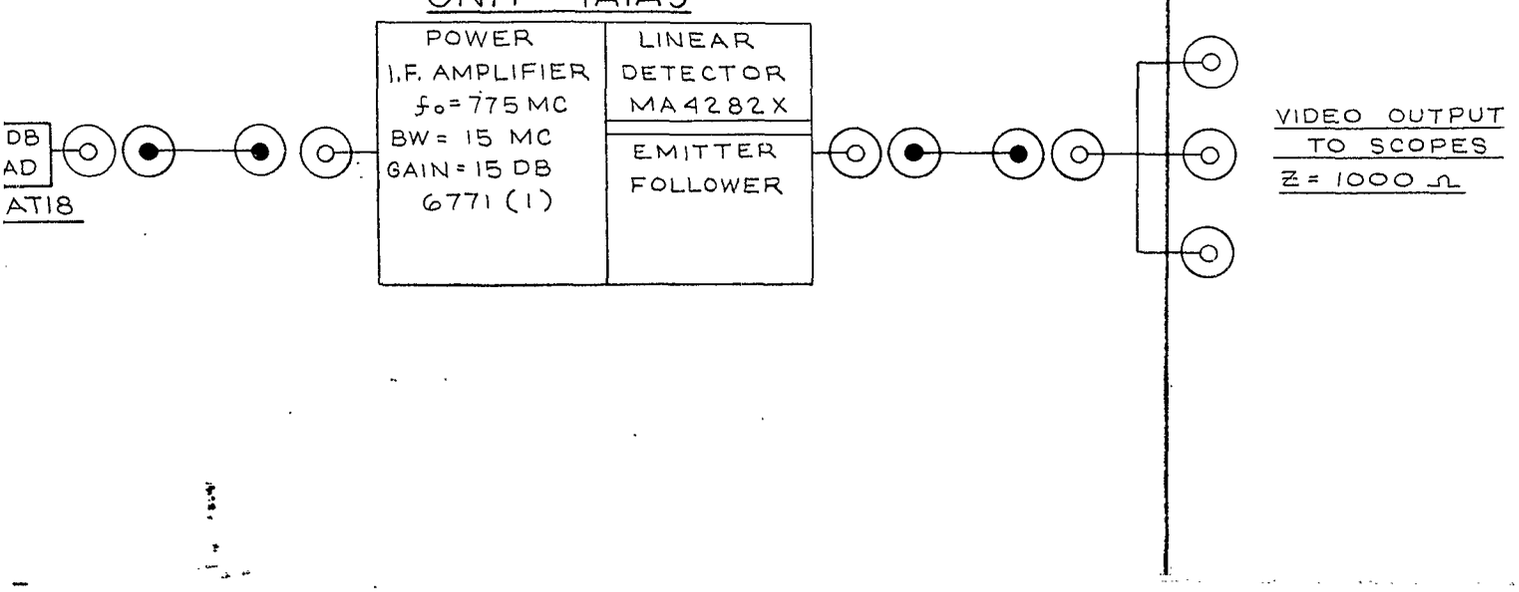
4

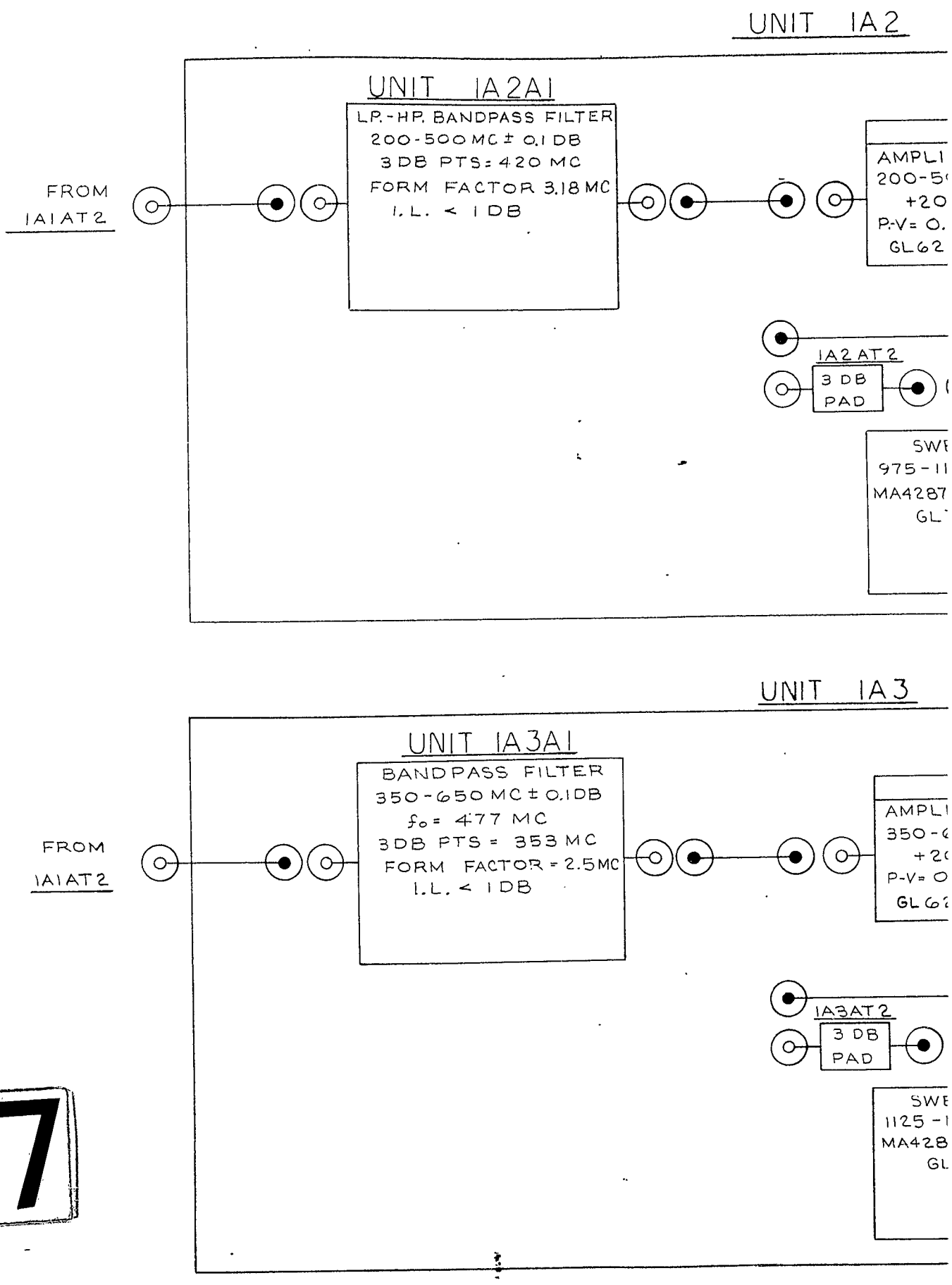

UNIT 1A1A5
I.F. AMPLIFIER
f_o = 775 MC
BW = 6.1 MC
GAIN = 31 DB
GL-6299 (2)
2 DB PAD
1A1AT10
2 DB PAD
1A1AT11
COAX RELAY
SP4T
DK# 323-011506-3
UNIT 1A1S7
15 DB PAD
1A1AT12
1A1AT13
1A1AT14
2 DB PAD
1A1AT15
2 DB
UNIT 1A1A6
BANDPASS FILTER
f_o = 775 MC
BW = 1.63 MC
I.L. > 11 DB
UNIT 1A1A7
BANDPASS FILTER
f_o = 775 MC
BW = 500 KC
I.L. > 11 DB
2 DB PAD
1A1AT
2 DB PAD
1A1AT


(UNIT 1A1AT1)
TO IF ATTENUATOR
(UNIT 1A1S2)
TO LIN-LOG SWITCH
5
2 DB PAD
1A1AT16
2 DB PAD
1A1AT17
COAX RELAY
SP4T
DK# 323-011506-3
UNIT 1A1S8
LIN.-LOG I.F. AMPLIFIER
f_o = 775 MC
BW = 10 MC
GAIN = 60 DB
GL6299 (6)
2N1492 (3)
2N1720 (1)
1N916B (5)
1N416E (1)
UNIT 1A1A8
2 DB PAD
1A1AT18

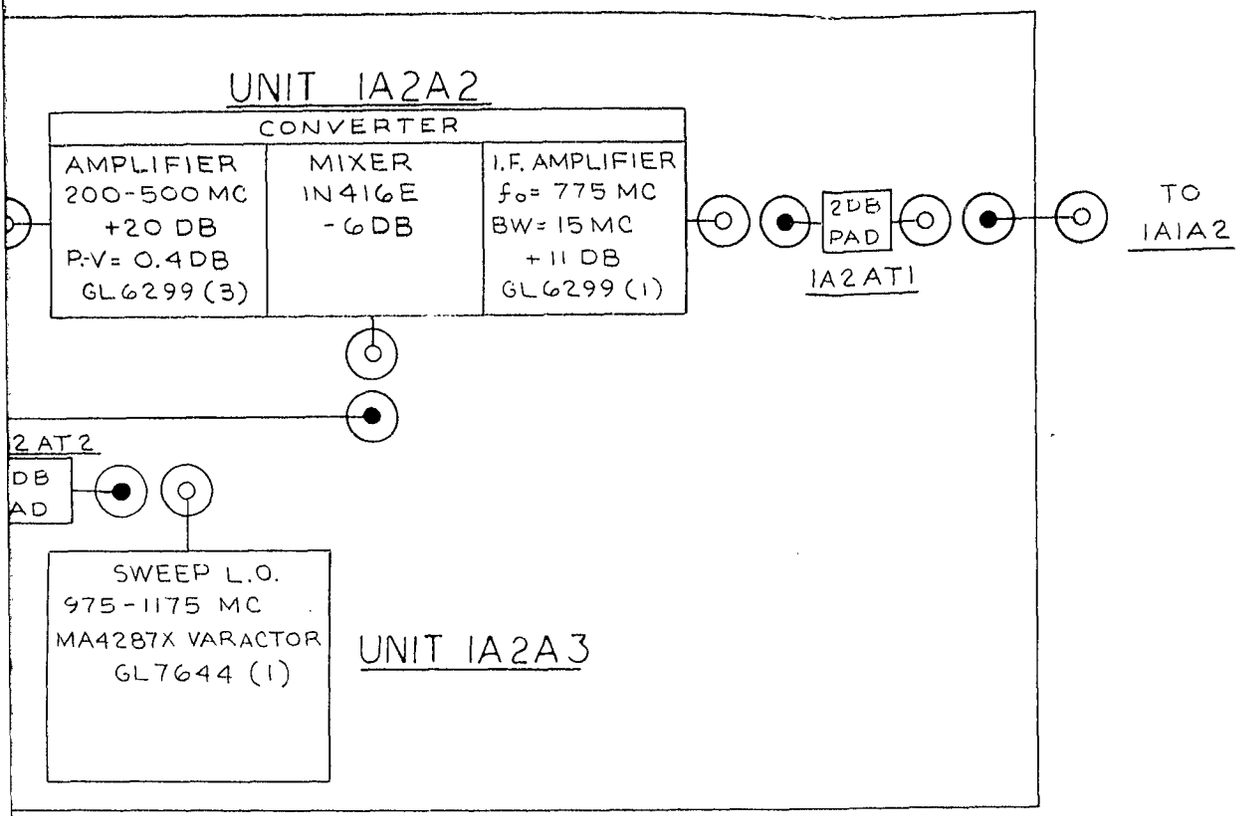
6

UNIT 1A1A9

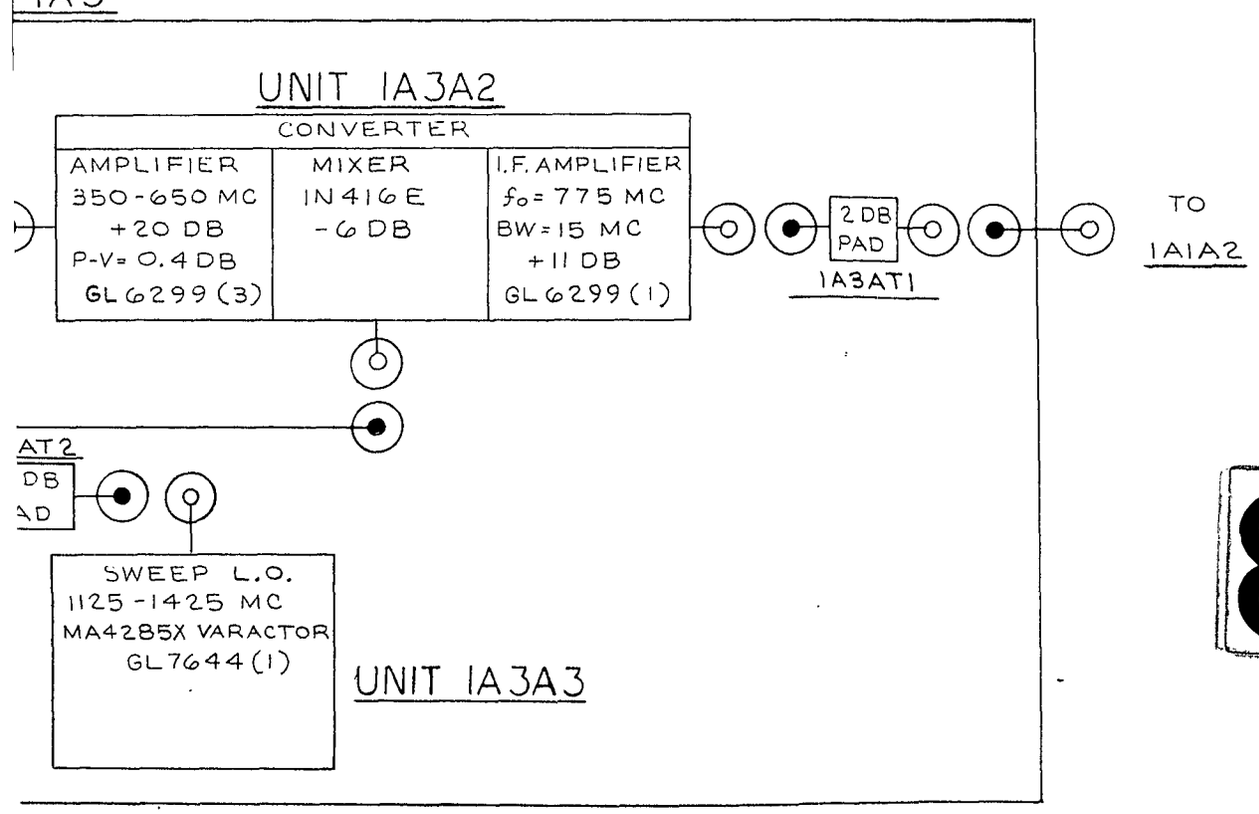

DB
AD
AT18
POWER
I.F. AMPLIFIER
f_o = 775 MC
BW = 15 MC
GAIN = 15 DB
6771 (1)
LINEAR
DETECTOR
MA4282X
EMITTER
FOLLOWER
VIDEO OUTPUT
TO SCOPES
Z = 1000 Ω


UNIT 1A2
UNIT 1A2A1
LP.-HP. BANDPASS FILTER
200-500 MC ± 0.1 DB
3 DB PTS = 420 MC
FORM FACTOR 3.18 MC
I.L. < 1 DB
FROM
1A1AT2
AMPLI
200-5
+20
P-V= 0.
GL62
1A2AT2
3 DB
PAD
SWE
975-11
MA4287
GL
UNIT 1A3
UNIT 1A3A1
BANDPASS FILTER
350-650 MC ± 0.1DB
f_o = 477 MC
3DB PTS = 353 MC
FORM FACTOR = 2.5MC
I.L. < 1 DB
FROM
1A1AT2
AMPLI
350-
+2
P-V= 0
GL62
1A3AT2
3 DB
PAD
SWE
1125-
MA428
GL

1A2

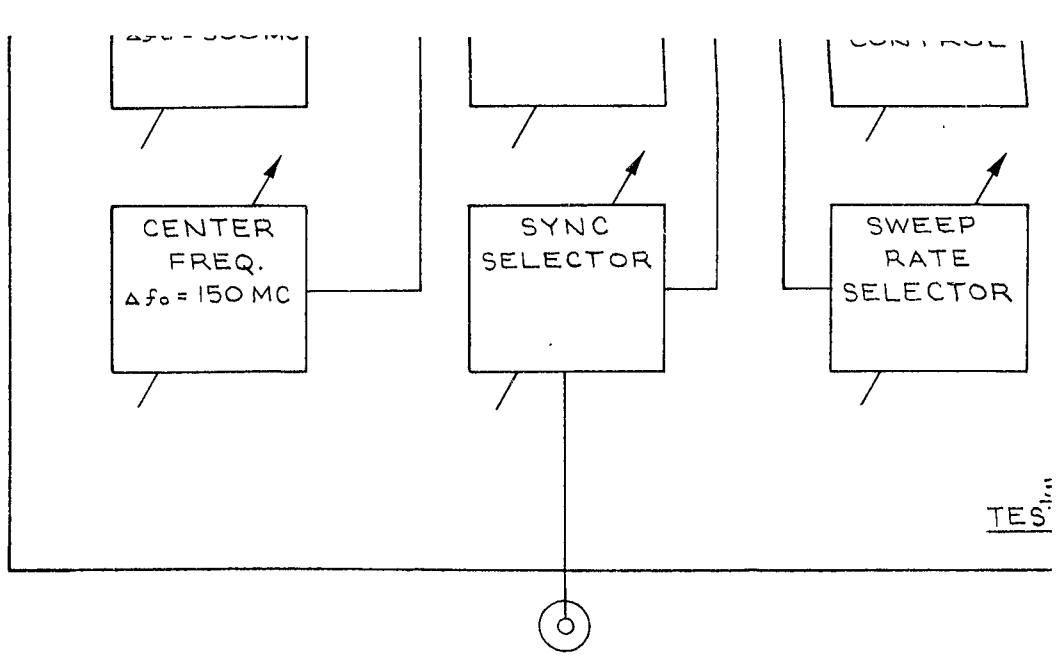

UNIT 1A2A2
CONVERTER
AMPLIFIER
200-500 MC
+20 DB
P-V= 0.4 DB
GL6299 (3)
MIXER
IN416E
-6 DB
I.F. AMPLIFIER
f_o= 775 MC
BW= 15 MC
+11 DB
GL6299 (1)
2 DB PAD
1A2AT1
TO
1A1A2
2 AT 2
DB
AD
SWEEP L.O.
975-1175 MC
MA4287X VARACTOR
GL7644 (1)
UNIT 1A2A3

1A3


UNIT 1A3A2
CONVERTER
AMPLIFIER
350-650 MC
+20 DB
P-V= 0.4 DB
GL6299 (3)
MIXER
IN416E
-6 DB
I.F. AMPLIFIER
f_o= 775 MC
BW= 15 MC
+11 DB
GL6299 (1)
2 DB PAD
1A3AT1
TO
1A1A2
AT2
DB
AD
SWEEP L.O.
1125-1425 MC
MA4285X VARACTOR
GL7644 (1)
UNIT 1A3A3

REVISIONS			
ISSUE	DESCRIPTION	DATE	BY

9


CENTER
FREQ.
Δf₀ = 150 MC
SYNC
SELECTOR
SWEEP
RATE
SELECTOR

2- 1.5 MC
3- 400 KC
4- 25 KC
5- 5KC

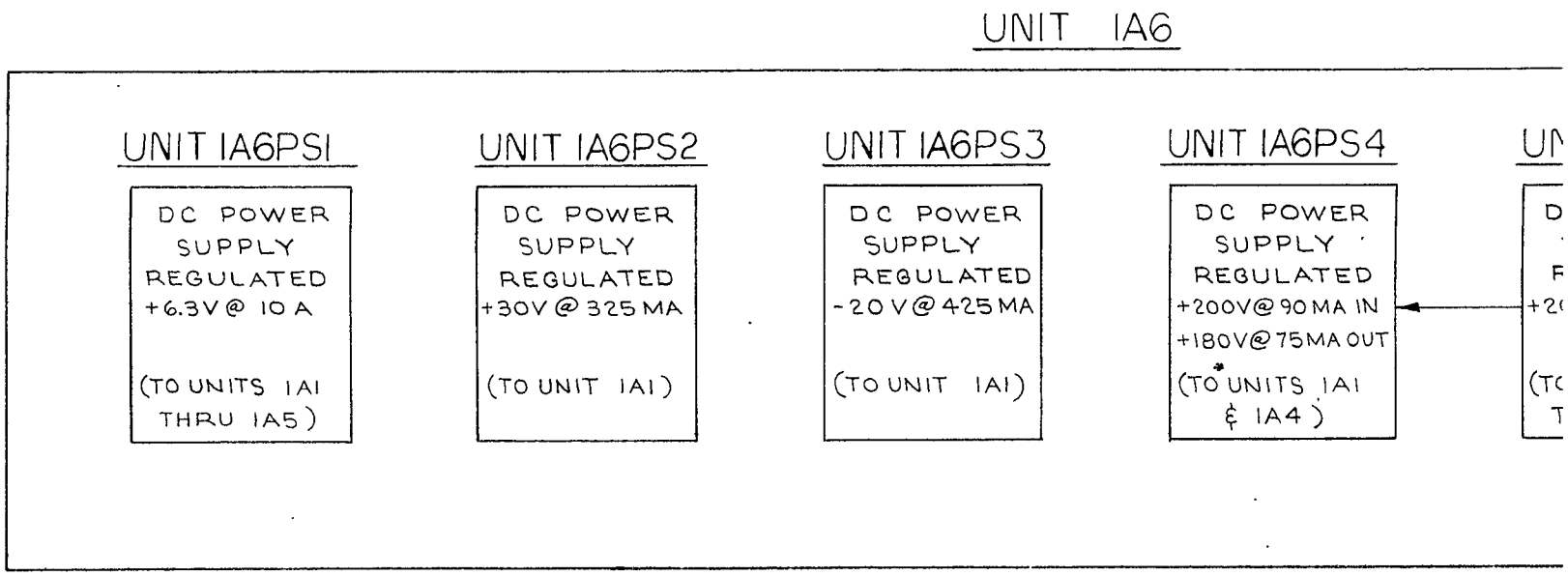
UNIT 1AIS2
LIN. - LOG. SELECTOR SWITCH

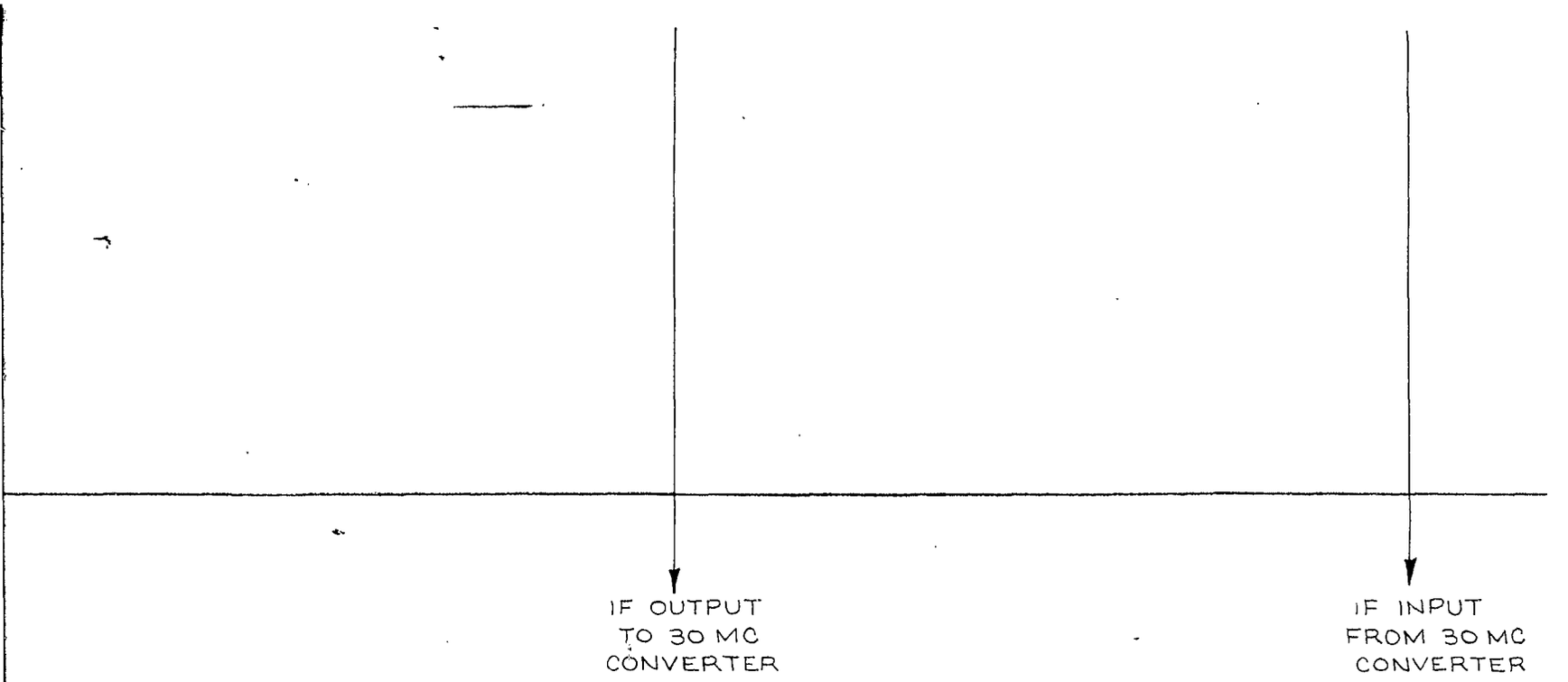
UNIT 1AICB1
MAW CIRCUIT BREAKER

UNIT 1AIS3
PLATE SWITCH

UNIT 1AIM1
3" DIA TEST METER
M

UNIT 1AIS4
METER CIRCUIT SWITCH


UNIT 1A6
UNIT 1A6PS1
DC POWER SUPPLY REGULATED +6.3V @ 10 A
(TO UNITS 1A1 THRU 1A5)
UNIT 1A6PS2
DC POWER SUPPLY REGULATED +30V @ 325 MA
(TO UNIT 1A1)
UNIT 1A6PS3
DC POWER SUPPLY REGULATED -20 V @ 425 MA
(TO UNIT 1A1)
UNIT 1A6PS4
DC POWER SUPPLY REGULATED +200V @ 90 MA IN +180V @ 75 MA OUT
(TO UNITS 1A1 & 1A4)



UNIT 1A6PS5

DC POWER
SUPPLY
REGULATED
+200V@450MA

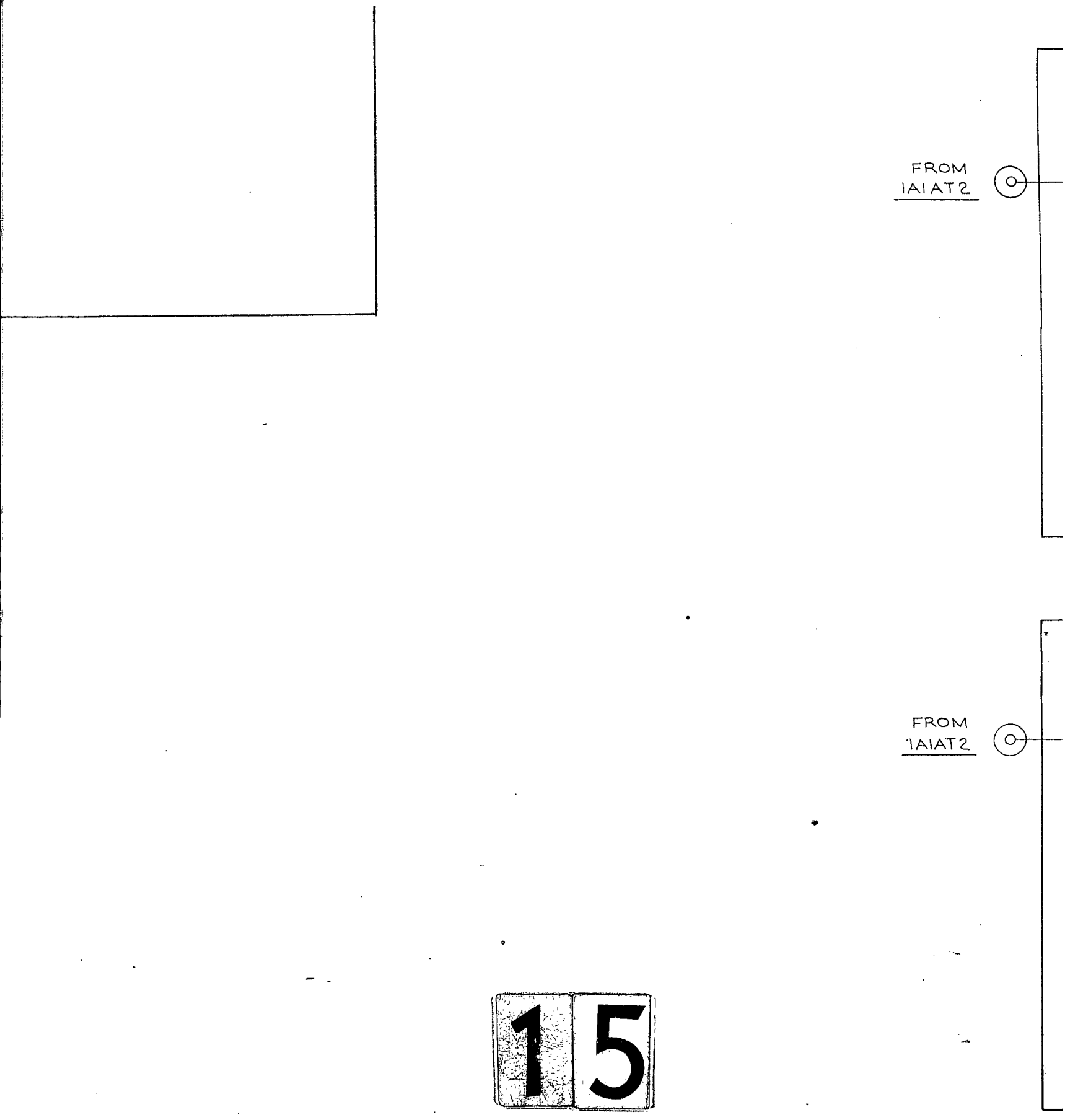
(TO UNITS 1A1
THRU 1A5)

UNIT 1A6PS6

DC POWER
SUPPLY
REGULATED
+30V@325MA

(TO UNIT 1A1)


14


FROM
1A1AT2
FROM
1A1AT2

UNIT 1A4

FROM A1AT2

UNIT 1A4AT

BANDPASS FILTER
650-950 MC ± 0.1 DB
f_o = 785 MC
3 DP PTS = 353 MC
FORM FACTOR 2.5MC
I.L. < 1 DB

UNIT 1A4A2

CONVERTER

AMPLIFIER	MIXER	I.F. AM
650-950 MC +20 DB P-V = 0.4 DB GL6299 (4)	IN416E -6 DB	f_o = 4 BW = 1 +11 GL6

1A4AT2
3 DB PAD

SWEEP L.O.
1125-1475 MC
MA4285X VARACTOR
GL7644 (1)

UNIT 1A4A3

475-775 MC CONVERTER

MIXER
5435 (1)
+4 DB

L.O. 1250 MC
7391 (1)

UNIT 1A4A4

UNIT 1A5

FROM 1A1AT2

UNIT 1A5A1

BANDPASS FILTER
850-1150 MC ± 0.1 DB
f_o = 1015 MC
3 DB PTS = 353 MC
FORM FACTOR 2.5MC
I.L. < 1 DB

UNIT 1A5A2

CONVERTER

AMPLIFIER	MIXER	I.F. AM
850-1150 MC +20 DB P-V = 0.4 DB GL6299 (4)	IN416E -6 DB	f_o = 4 BW = +11 GL6

1A5AT2
3 DB PAD

SWEEP L.O.
1325-1625 MC
MA4283X VARACTOR
GL7644 (1)

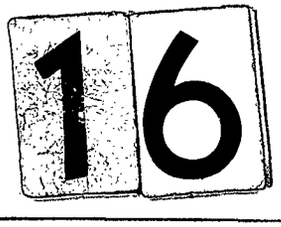
UNIT 1A5A3

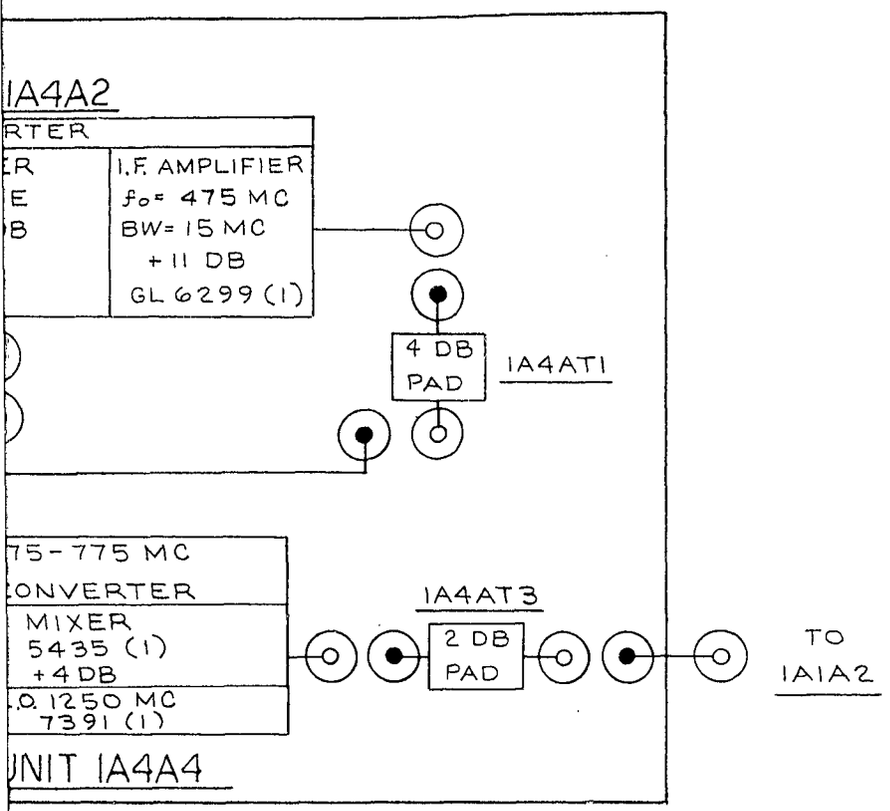
475-775 MC CONVERTER

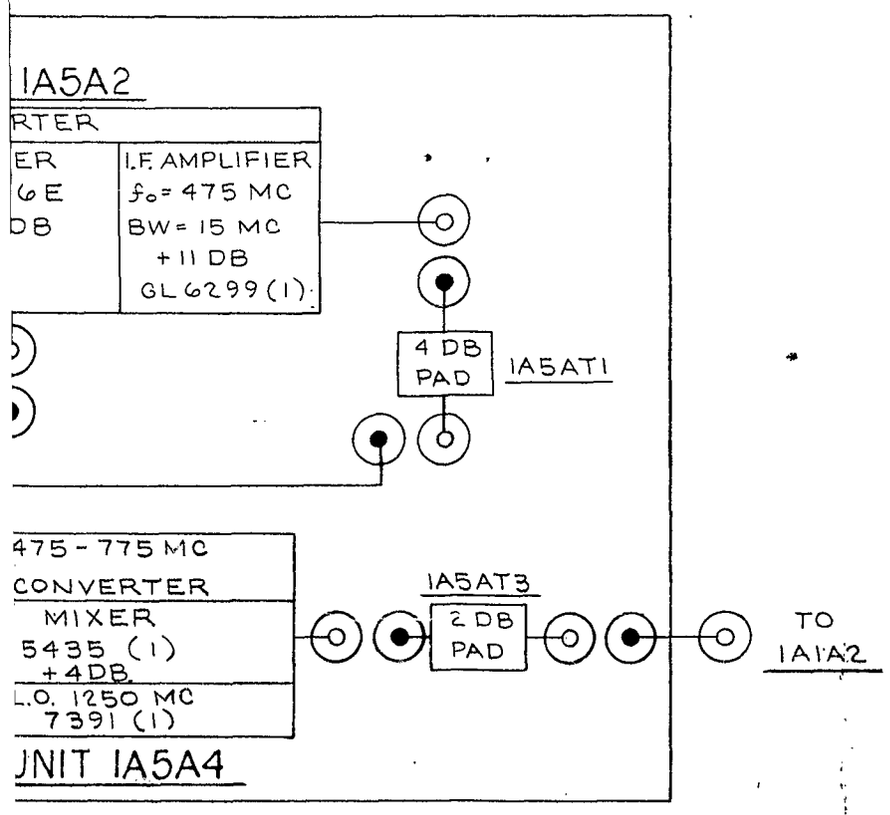
MIXER
5435 (1)
+4 DB

L.O. 1250 MC
7391 (1)

UNIT 1A5A







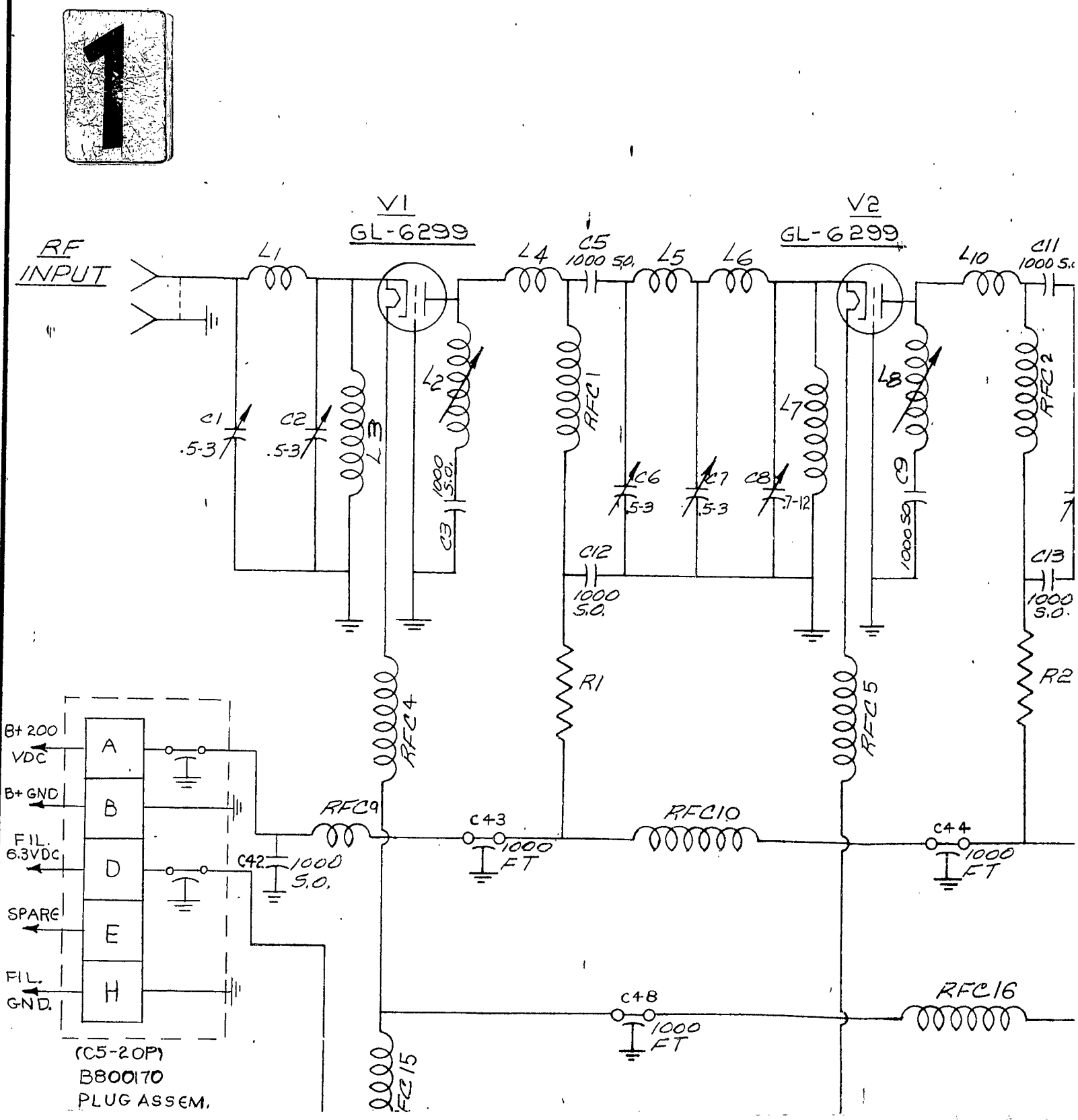
17

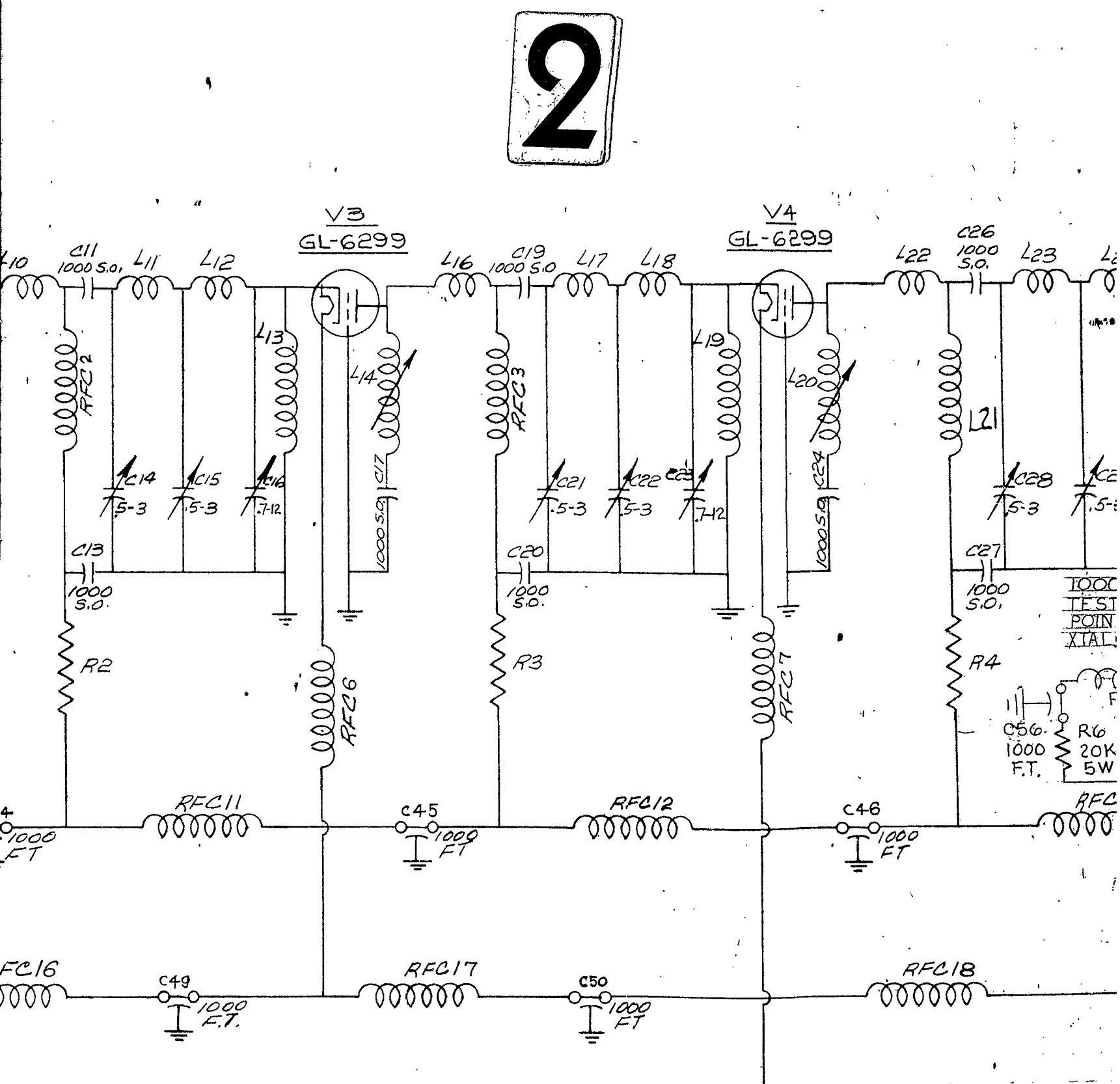
		ALL DIMENSIONS IN INCHES, UNLESS OTHERWISE SPECIFIED TOLERANCES: FRACTIONS ± 1/64 ANGLES ± 1/2° DECIMALS .XX ± .010 .XXX ± .005	DRAWN 3-22-62
			DRAWN BY A. Kennard
		MATERIAL: ~	CHECKED
431-02		FINISH: ~	APPROVED
JOB NO.	NEXT ASSEMBLY		APPROVED
APPLICATION			SCAL

18

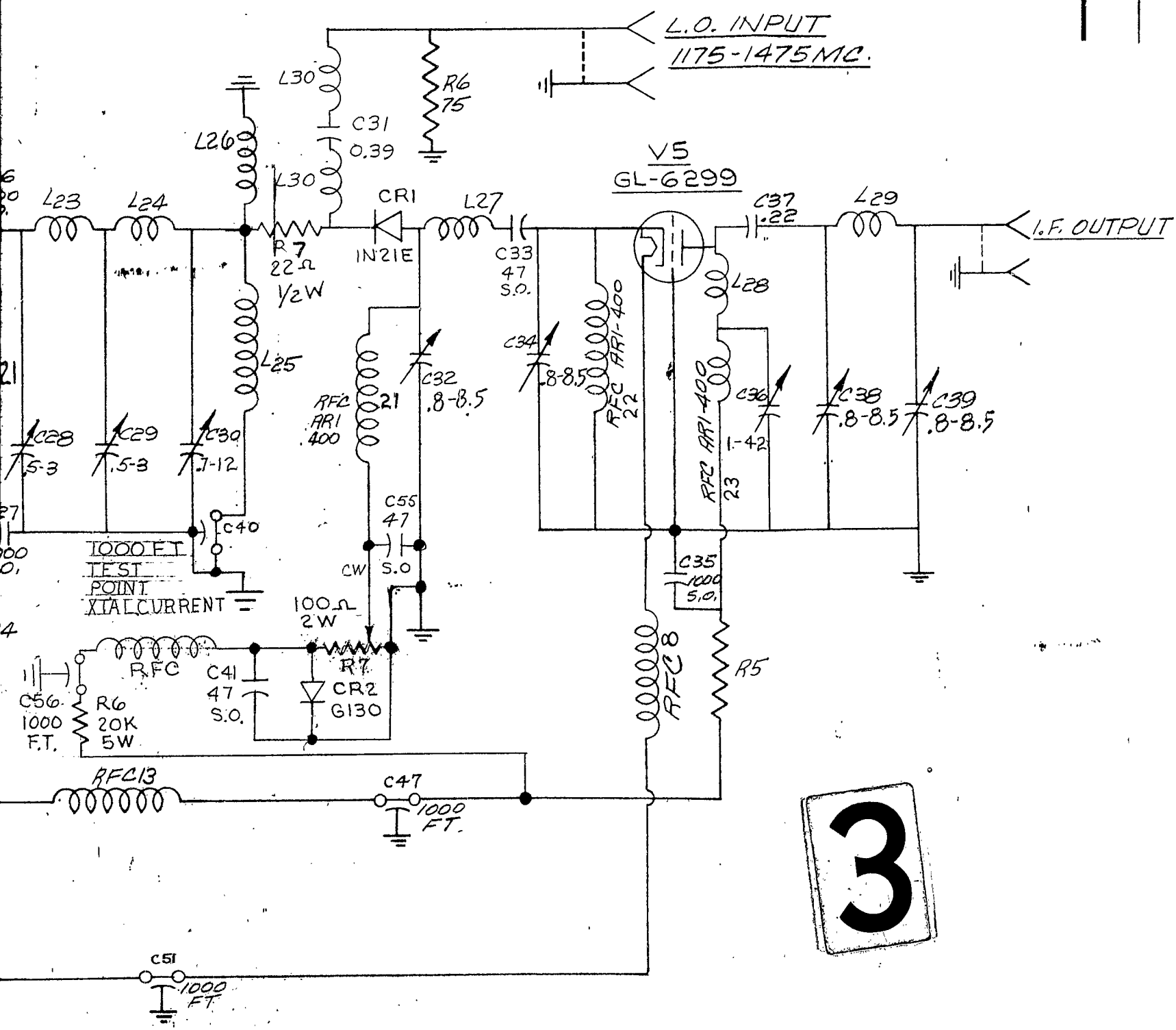
431-02		ALL DIMENSIONS IN INCHES, UNLESS OTHERWISE SPECIFIED TOLERANCES: FRACTIONS ± 1/64 ANGLES ± 1/2° DECIMALS .XX ± .010 .XXX ± .005	DRAWN 3-22-62	BLOCK DIAGRAM RF SIGNAL SURVEILLANCE SYS.	APPLIED RESEARCH INC. PORT WASHINGTON NEW YORK	
JOB NO.	NEXT ASSEMBLY	MATERIAL: ~	DRAWN BY R. Hennessy			
APPLICATION		FINISH: ~	CHECKED		DWG. SIZE R	700458
			APPROVED			
			APPROVED	SCALE ~	UNIT WT. ~	ISSUE A

Fig 1

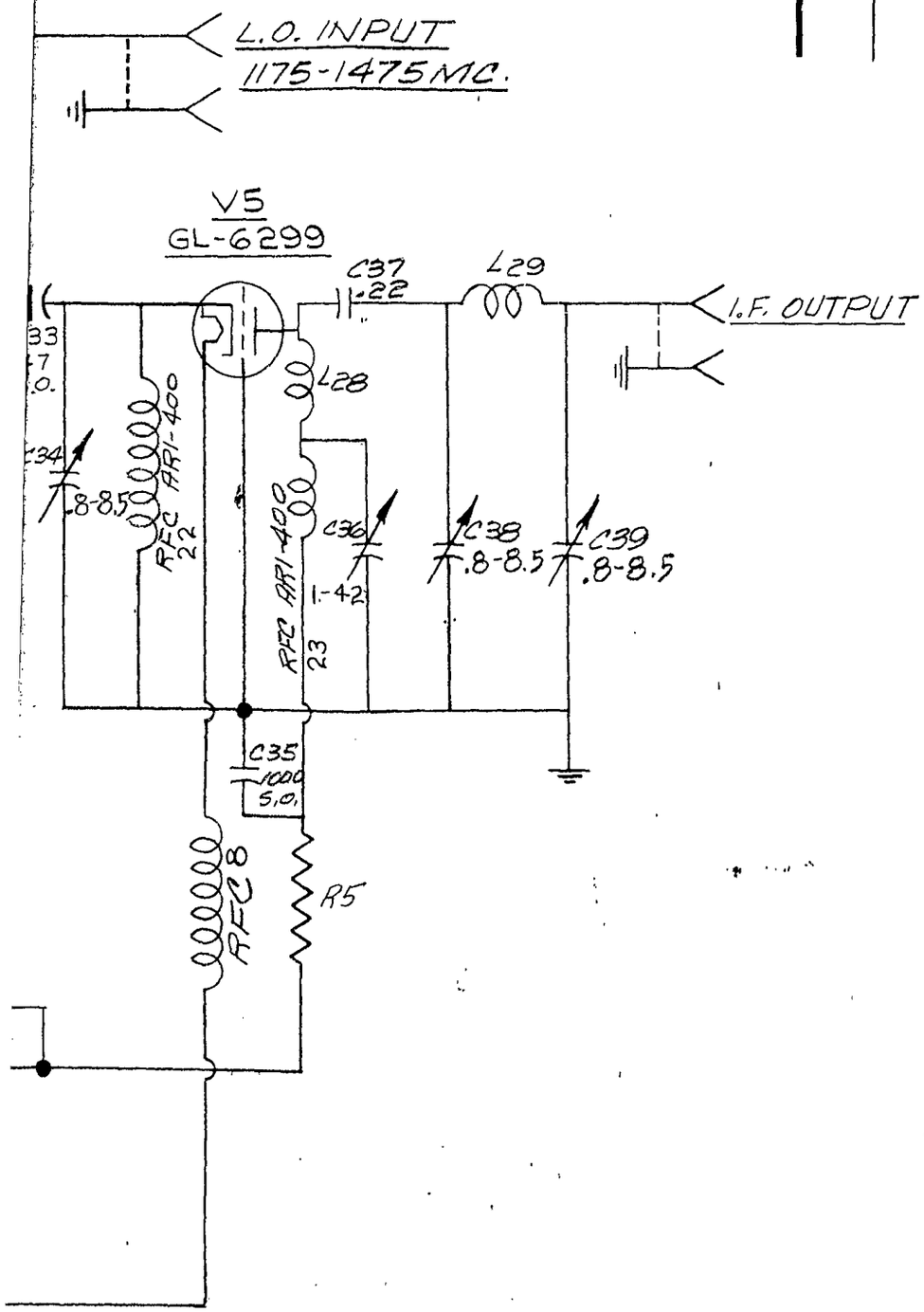

1
V1
GL-6299
V2
GL-6299
RF
INPUT
L1
L2
L3
L4
L5
L6
L7
L8
L10
C1
.5-3
C2
.5-3
C3
1000
S.O.
C5
1000 S.O.
C6
.5-3
C7
.5-3
C8
.7-12
C9
1000 S.O.
C11
1000 S.O.
C12
1000
S.O.
C13
1000
S.O.
RFC1
RFC2
RFC4
RFC5
R1
R2
RFC9
RFC10
RFC16
RFC15
C4-3
1000
FT
C4-4
1000
FT
C4-8
1000
FT
C42
1000
S.O.
B+ 200
VDC
B+ GND
FIL.
6.3VDC
SPARE
FIL.
GND.
A
B
D
E
H
(C5-20P)
B800170
PLUG ASSEM.


2
V3
GL-6299
V4
GL-6299
L10
C11
1000 S.O.
L11
L12
L13
L14
C17
1000 S.O.
L16
C19
1000 S.O.
L17
L18
L19
L20
L22
C26
1000
S.O.
L23
L21
RFC2
RFC3
RFC6
RFC17
C14
.5-3
C15
.5-3
C16
.7-12
C21
.5-3
C22
.5-3
.7-12
C28
.5-3
C13
1000
S.O.
C20
1000
S.O.
C27
1000
S.O.
R2
R3
R4
C56
1000
F.T.
R6
20K
5W
RFC11
RFC12
C45
1000
FT
C46
1000
FT
1000
FT
RFC16
C49
1000
F.T.
RFC17
C50
1000
FT
RFC18

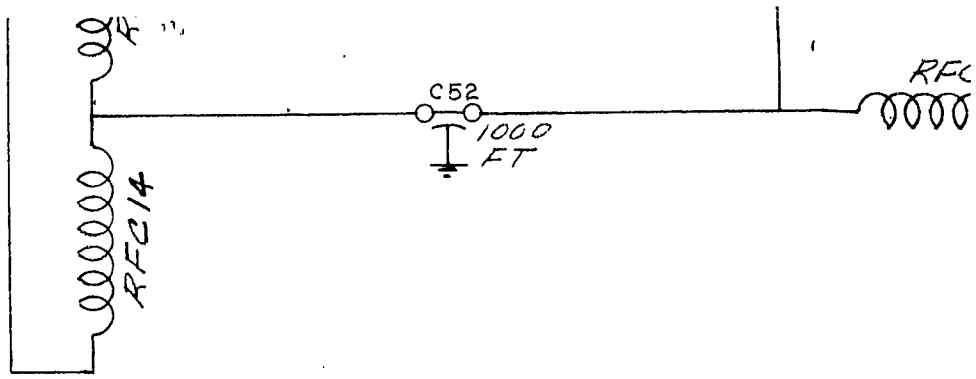
ISSUE	
B	R.


L.O. INPUT
1175-1475MC.
L30
R6
75
C31
0.39
L26
L30
V5
GL-6299
L23
L24
CR1
L27
C37
.22
L29
I.F. OUTPUT
R7
22Ω
1/2W
IN21E
C33
47
S.O.
L28
L25
C34
.8-8.5
RFC ARI-400
22
C32
.8-8.5
RFC
ARI
.400
21
C36
1-42
RFC ARI-400
23
C38
.8-8.5
C39
.8-8.5
C28
5-3
C29
5-3
C30
7-12
C40
1000 F.T.
TEST
POINT
XTAL CURRENT
C55
47
CW
S.O
C35
1000
5.0.
100Ω
2W
R7
RFC
C41
47
S.O.
CR2
G130
C56
1000
F.T.
R6
20K
5W
RFC8
R5
RFC13
C47
1000
FT.
C51
1000
FT.
3

REVISIONS			
ISSUE	DESCRIPTION	DATE	BY
B	REVISED	4-7-62	ack

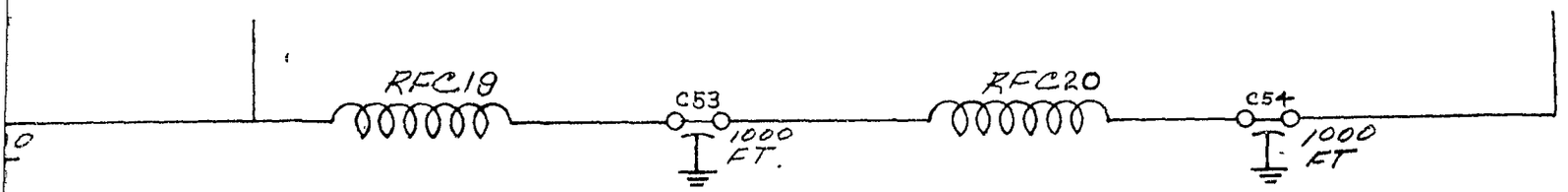


4



5

OGILVIE PRESS, INC., BROOKLYN 17, N. Y. ULTRAVEL NO. 490M



HIGHEST COMPONENT DESIGNATION					
C56	L30	R7	RFC 23	V 5	D2

000
T

NOTE

1. ALL CAPACITOR
2 ALL RESISTORS
3. R1 THRU R5, SE
10 MA TUBE C
4. RF= 700 - 1000 MCS
IF = 475 MCS
5. RFC1 - 20 = ARI 80

JATION
Y 5 D2

7

491-01	
JOB NO.	NEXT ASSEMBLY
APPLICATION	

ALL DIMENSIONS IN INCH
OTHERWISE SPECIFIED TO
FRACTIONS ± 1/64 ANG
DECIMALS .XX ± .010
MATERIAL:
FINISH:

E

ALL CAPACITORS IN μμf

ALL RESISTORS 1 WATT UNLESS OTHERWISE SPECIFIED

R1 THRU R5, SELECTED FOR
10 MA TUBE CURRENT

00-1000MCS

F = 475 MCS

FC1-20 = AR1 800

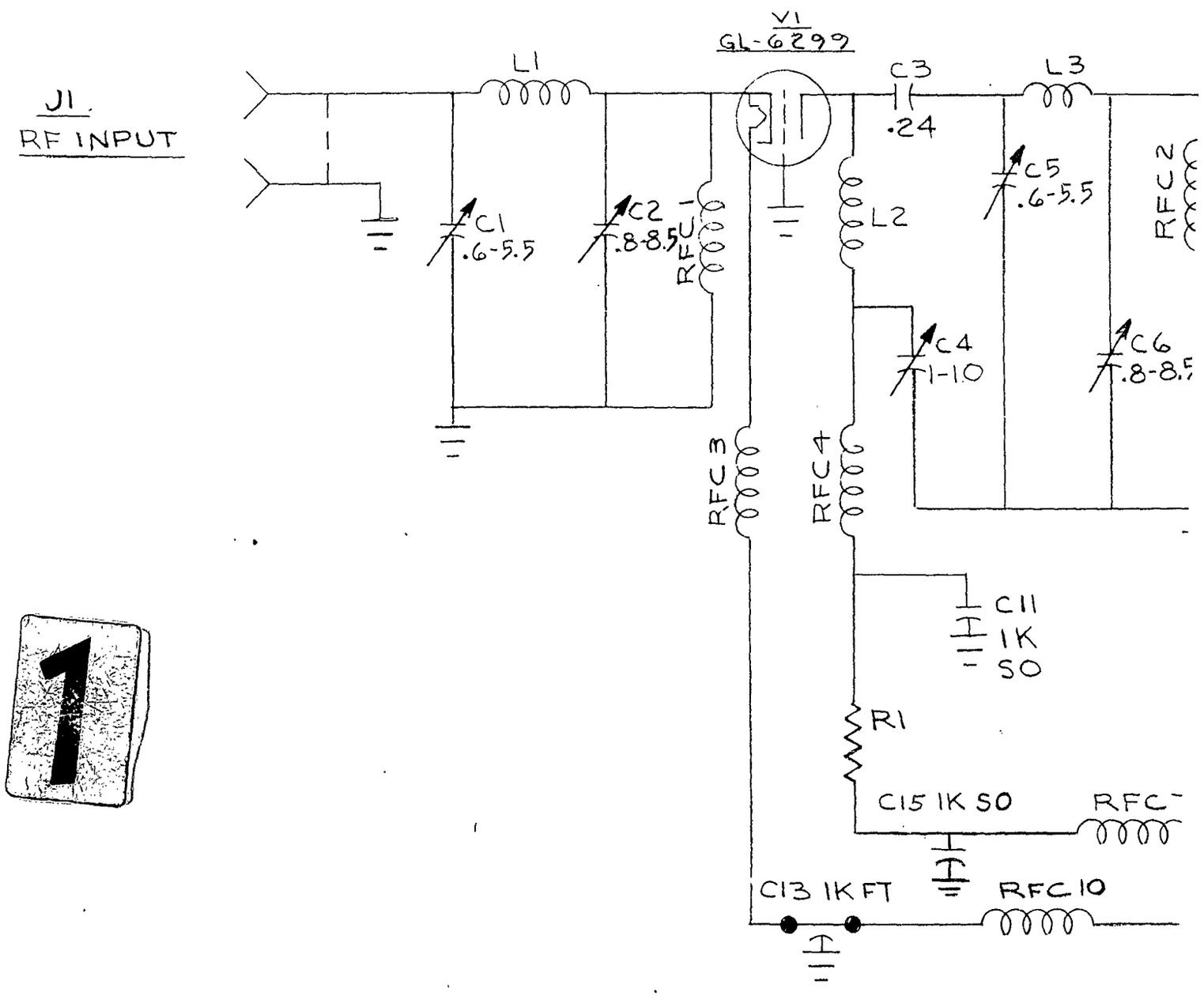
8

	ALL DIMENSIONS IN INCHES, UNLESS OTHERWISE SPECIFIED TOLERANCES: FRACTIONS ± 1/64 ANGLES ± 1/2° DECIMALS .XX ± .010 .XXX ± .005	DRAWN 3-19-62	SCHEMATIC UH-C(A)70100-475/15 CONVERTER UNIT 1A6A2	APPLIED RESEARCH INC. PORT WASHINGTON NEW YORK	
MBLY	MATERIAL:	DRAWN BY PJS			
	FINISH:	CHECKED		DWG. SIZE D	600734
		APPROVED			ISSUE B
		APPROVED	SCALE	UNIT WT.	

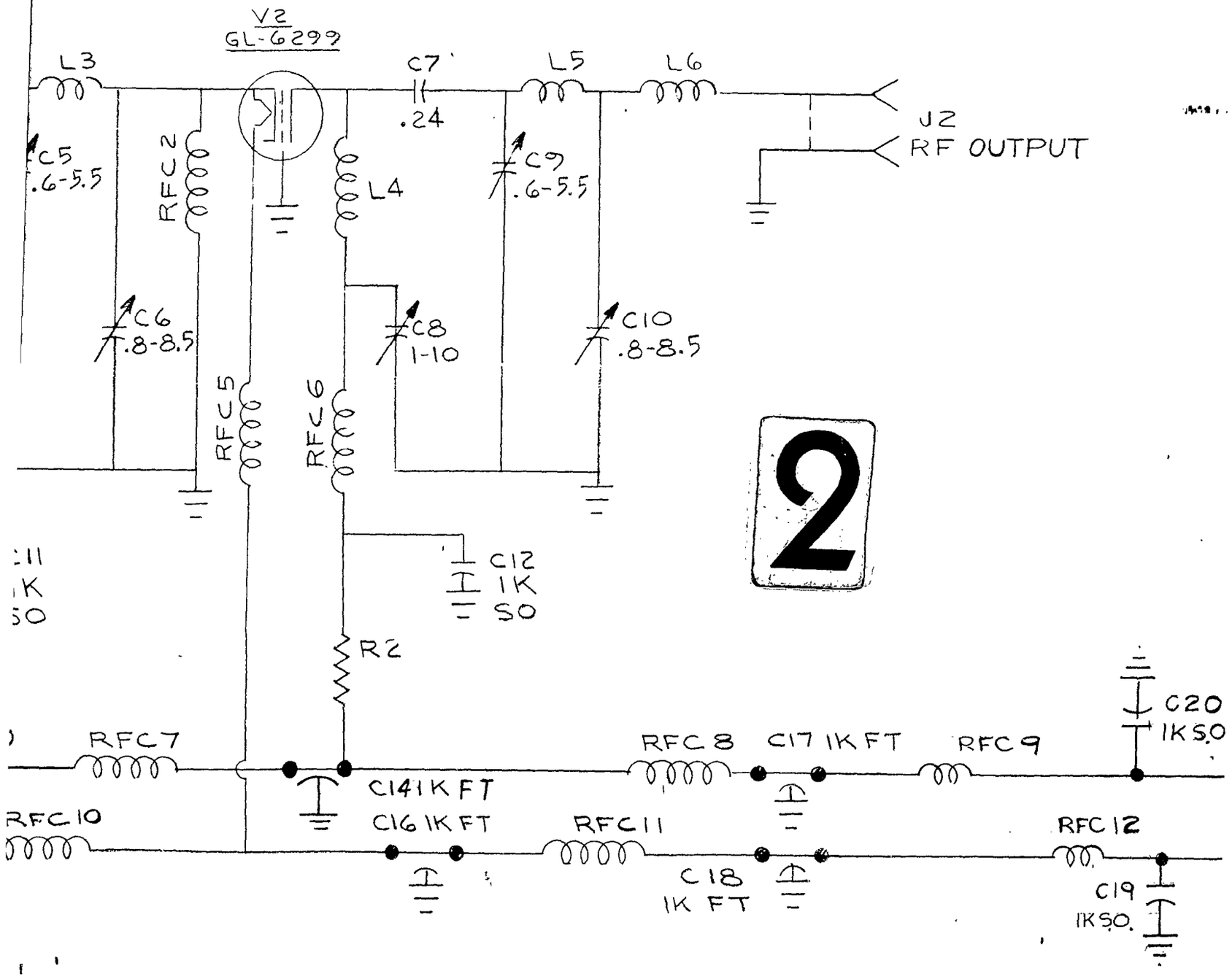
UNIT 5150

FIG. 12

D 600734 ISSUE B

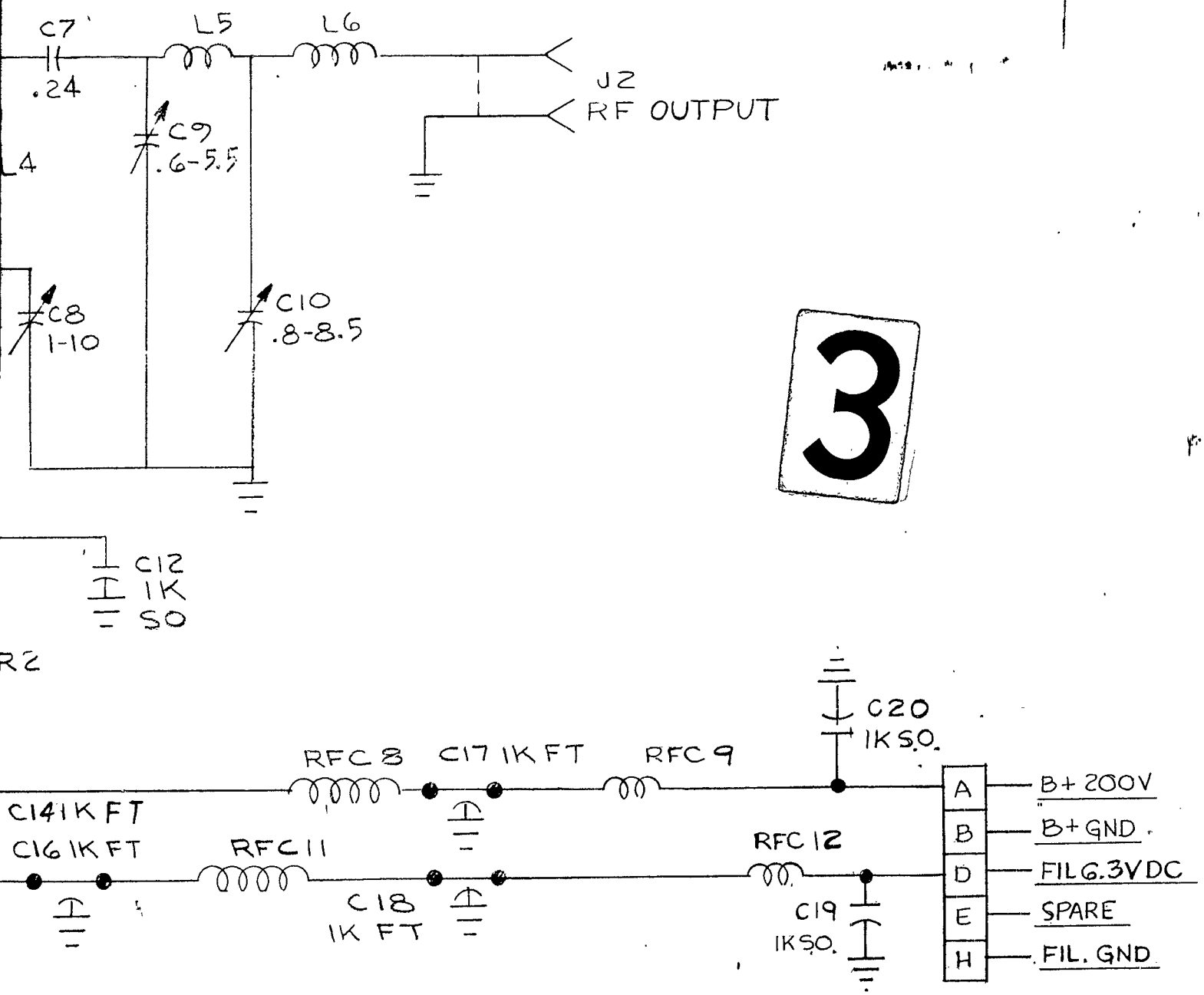

J1
RF INPUT
V1
GL-6299
L1
C1
.6-5.5
C2
.8-8.5
RFC
L2
C3
.24
L3
C5
.6-5.5
RFC
C4
1-10
C6
.8-8.5
RFC3
RFC4
C11
1K
SO
R1
C15 1K SO
RFC
C13 1K FT
RFC10

REVISI	
ISSUE	DESCRIPTION
B	ELEC. REVISED
C	REVISED



2

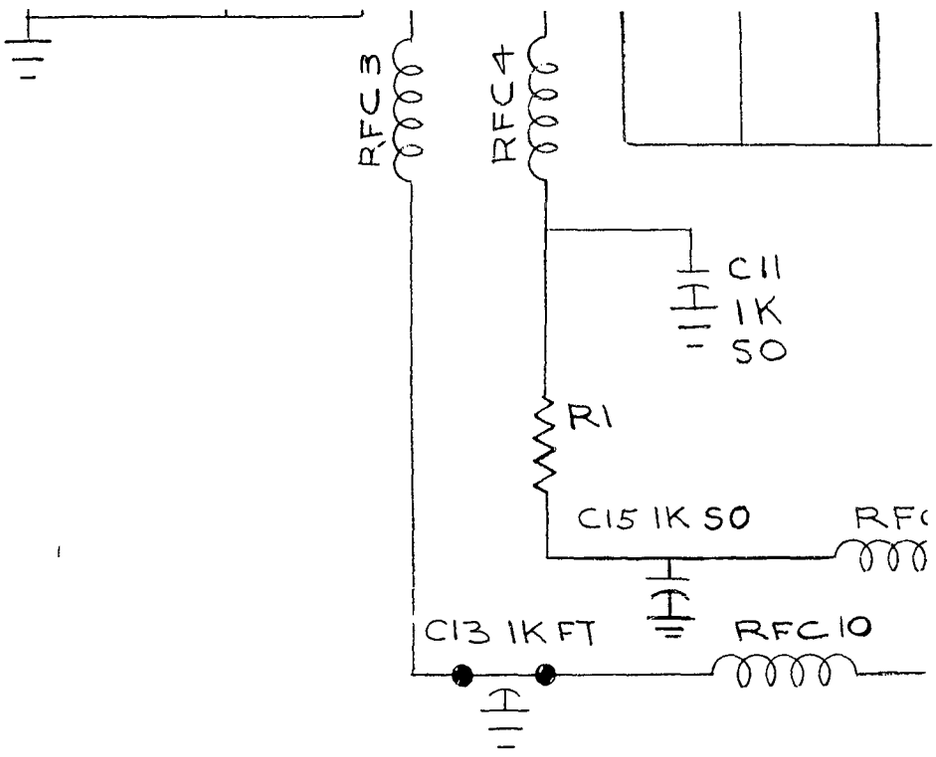
REVISIONS			
ISSUE	DESCRIPTION	DATE	BY
B	ELEC. REVISED	5-22-62	M.M.
C	REVISED	6-15-62	JSF



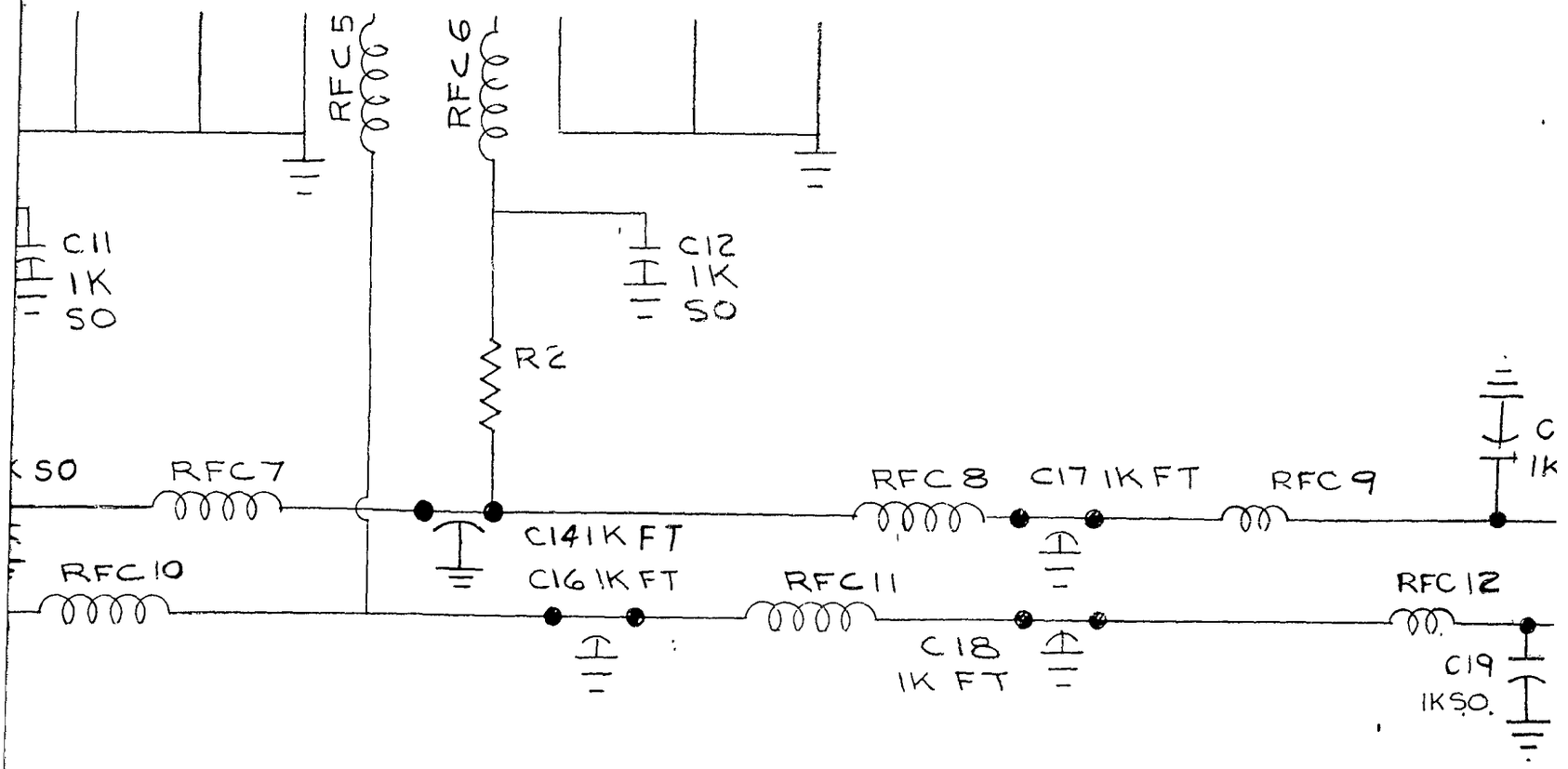
3

ISSUE C

600750



4

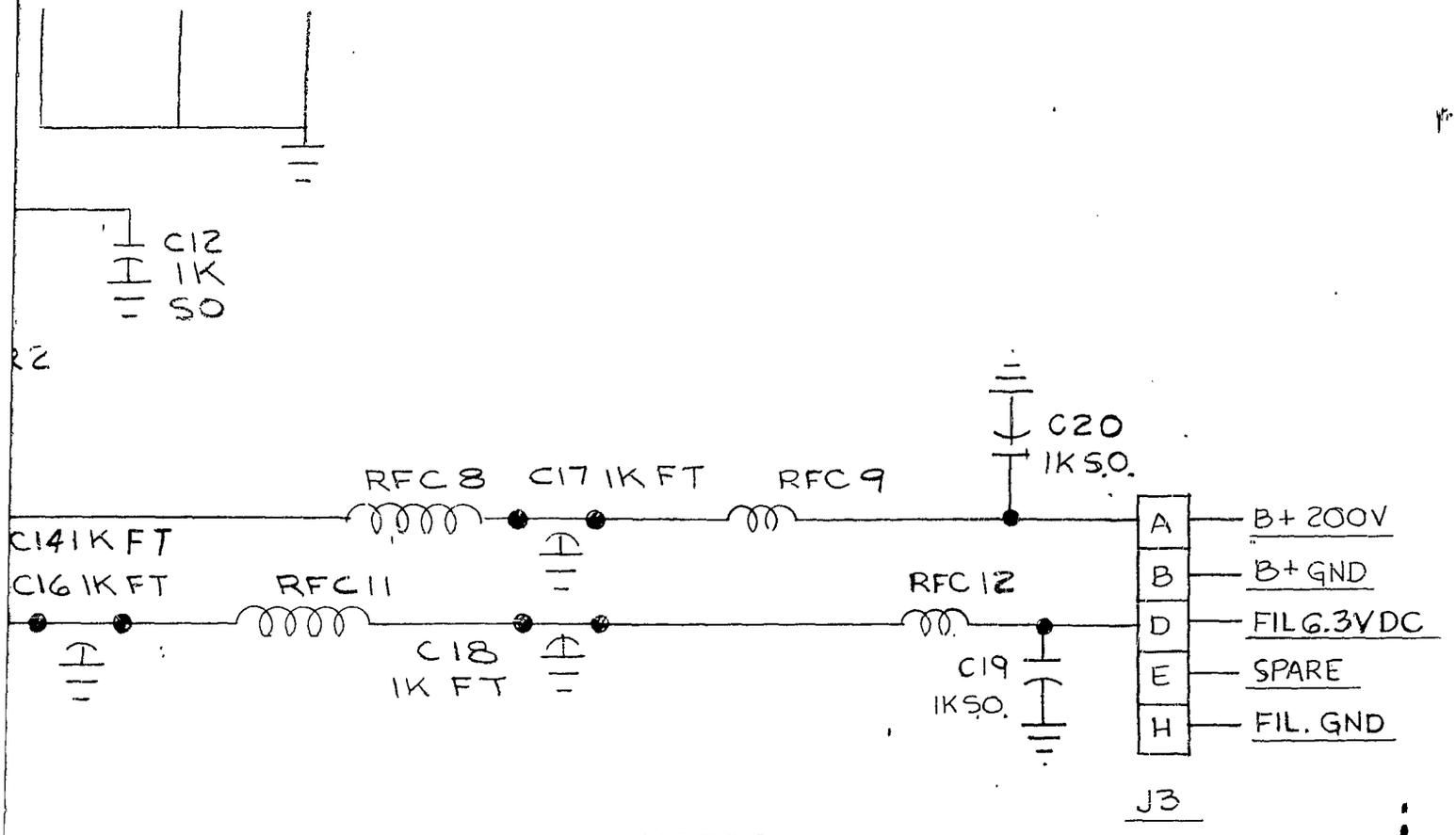


NOTES

1. R1 & R2 SELECTED
   TUBE CURRENT.
2. F_o = 775 MC

5

491-01		ALL DIMENSIONS IN INCHES, UNLESS OTHERWISE SPECIFIED TOLERANCES: FRACTIONS ± 1/64 ANGLES ± 1/2° DECIMALS .XX ± .010 .XXX ± .005	DRAWN 3-29-62	SCHEMATIC E-2(A) 775/6 AMPLIFIE UNIT 1A7A1 & 1A7A4
JOB NO.	NEXT ASSEMBLY	MATERIAL:	DRAWN BY P. Kennard	
APPLICATION		FINISH:	CHECKED	
			APPROVED	
			APPROVED	SCALE UNIT WT.



NOTES

1. R1 & R2 SELECTED FOR 10 MA TUBE CURRENT.
2. F_o = 775 MC

6

ALL DIMENSIONS IN INCHES, UNLESS OTHERWISE SPECIFIED TOLERANCES: FRACTIONS ± 1/64 ANGLES ± 1/2° DECIMALS .XX ± .010 .XXX ± .005	DRAWN 3-29-62	SCHEMATIC E-2(A) 775/6 AMPLIFIER UNIT 1A7A1 & 1A7A4	APPLIED RESEARCH INC. PORT WASHINGTON NEW YORK	
MATERIAL:	DRAWN BY D. Kennard			
	CHECKED			
FINISH:	APPROVED		DWG. SIZE C	600750
	APPROVED	SCALE	UNIT WT.	ISSUE C

ISSUE C

600750

Fig. 10.